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FM 31-10

DEPARTMENT OF THE ARMY FIELD MANUAL

BARRIERS AND DENIAL OPERATIONS



**HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1962**



FM 31-10

C 1

Reference

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 4 June 1965

BARRIERS AND DENIAL OPERATIONS

FM 31-10, 14 August 1962, is changed as follows:

Make the following pen-and-ink changes:

Throughout the manual, change FM 101-31 to FM 101-31-1.

7. Construction Responsibility

(Superseded)

a. *Combat Units.* Construction of obstacles for close-in defense and security is the responsibility of the unit commander. These obstacles may be integrated into the barrier plan of a division or higher command. Ordinarily, each tactical unit constructs that part of the barrier system that lies within its area of responsibility. Engineer assistance in the form of technical advice and supervision normally is furnished the unit as needed.

b. *Engineer Units.* Engineer units are responsible for—

- (1) Furnishing technical advice and supervision.
- (2) Siting and constructing specific individual obstacles and/or barriers which—
 - (a) Require special skills and equipment.
 - (b) Protect exposed flanks or rear.
 - (c) Benefit the command as a whole.
 - (d) Must be prepared before the arrival of the troops who are to occupy the area.
 - (e) Lie outside of the area of responsibility of any particular unit.
- (3) Estimating requirements for obstacle materials.
- (4) Recommending the location of supply points to support barrier construction.
- (5) Recommending the allocation of engineer troops to assist combat units and to construct barriers.
- (6) Recommending the allocation of organic transportation of engineer units to assist in hauling barrier materials.

c. *Army, Corps, and Division Staff.* In addition to the general staff responsibilities outlined in FM 101-5, staff responsibilities include estimating broad requirements for and recommending the allocation of munitions filled with chemical agents to include flame (thickened fuel) and nuclear weapons or ADM for radiological contamination purposes.

d. Field Army Support Command. Field army support command (FASCOM) is concerned with detailed requirements and executes the broad plans and desires of the Army and corps staff. Barrier construction responsibilities of field army combat service support units are as follows:

(1) Ammunition brigade responsibilities include—

(a) Storing and issuing of thickener, peptizer, incendiary oil bursters, antitank and antipersonnel mines, explosives, trip flares and related materials.

(b) Designating the ammunition supply points to support barrier construction.

(2) Support brigade responsibilities include—

(a) Recommending the location of and establishing supply points (less class V) to support barrier construction.

(b) Procuring and issuing gasoline and the necessary containers used by using units for preparation of thickened fuel.

(3) Transportation brigade responsibilities include transporting barrier materials forward by highway, rail, water, or air within allocations (or priorities).

e. Signal Brigade. Signal brigade responsibilities include providing communications to the executing party (beyond organic capabilities) stationed at or near those obstacles vital to the plans of a higher command and reserved for destruction by that commander.

f. Division Support Command. The responsibilities of the division support command in barrier and obstacle construction include—

(1) Establishing class IV obstacle construction materials supply points in the division's area of responsibility.

(2) Procuring and issuing class IV obstacle construction materials.

(3) Supplementing field army transportation in hauling class IV obstacle construction materials into the division's area of responsibility when required.

(4) Procuring and controlling the issue of class V obstacle material, i.e., mines, fuzes, explosives, and related items.

(5) Supplementing unit transportation in hauling class V obstacle materials when required.

(6) Establishing mines and explosive dumps when required.

44. Use of Chemical Agents and Radiological Contamination in Barrier Operations

(Superseded)

a. General. Any barrier is made even more effective when chemical, biological or radiological (CBR) agents are used since the enemy is forced to mask, wear protective clothing, or decontaminate the

barrier. The tactics and techniques of chemical and radiological operations are contained in FMs 3-5, 3-10, and 3-12.

b. Authority.

- (1) *Toxic agents.* The initial authority to employ toxic chemical, biological, and radiological agents must first be received by the theater commander. After receipt, the theater commander may further delegate this authority to his subordinate commanders, subject to any policy restrictions deemed necessary. After receipt of initial authority, field army commanders are authorized to employ toxic chemical mines in barrier and nuisance minefields. This authority cannot be delegated lower than division and comparable commanders. The employment of toxic chemical mines normally is not authorized in protective or defensive minefields, unless they are later integrated into a barrier system. After authority to use toxic CBR agents is received, operations involving toxic chemical agents normally are planned and executed by divisions and higher units while operations involving toxic biological and radiological agents normally are planned and executed by corps and higher units.

- (2) *Other agents.* Commanders are authorized to use certain chemical agents such as riot control, flame, and incendiaries. Operations involving large scale use of such agents should be coordinated with adjacent and higher headquarters.

c. Chemical Agents. Toxic chemical mines, belts or toxic chemical agents, and flame mines are used to kill or disable personnel and to restrict the use of terrain and material. Toxic chemical agents may be used with other obstacles or as chemical barriers to protect the front or flanks, isolate the battle area, delay the enemy during retrograde operations, strengthen the defense, impede enemy counterattack, or isolate a bridgehead. A chemical barrier is an area contaminated by toxic chemical agents, or a minefield composed of toxic chemical mines. A chemical barrier is not absolute in itself and must be covered by supporting weapons fire or observation just as any other obstacle. This also forces the enemy into closer contact with the contamination. Toxic chemical agents are a hazard to friendly troops as well as to the enemy for the duration of their effects. This is considered when coordinating the use of toxic chemical agents with the barrier plan and other operation and logistic plans. Nontoxic chemical agents, primarily in the form of flame mines, are used for the same purposes as toxic chemical mines, as well as for battlefield illumination and for warning of an enemy approach at night. When using flame mines, the possible effect on other obstacle components, such as trip wires, electric detonating wire, and the chemical agents in chemical mines, is considered.

d. Radioactive Contaminants. Radioactive contamination can result from radioactive fallout or neutron induced radioactivity caused by the detonation of a nuclear weapon. The use of radiological contamination to produce casualties or restrict use of an area may be militarily feasible; however, it is seldom practical to employ a nuclear weapon solely to deny the enemy the use of an area by deliberately producing induced radioactivity. Outside of the initial effects area, radioactive fallout caused by the surface detonation of a nuclear weapon creates a residual effect which may cover many square miles. Contamination with radiological agents may be used in barriers in the same manner as contamination with toxic chemical agents.

APPENDIX I

REFERENCES

Delete

TC 3-1..... Ground Flame Field Expedients

Change

FM 101-31-1... Staff Officers' Field Manual; Nuclear Weapons Employment

DA Pam 310-3.. Military Publications Index of **Doctrinal**, Training, and **Organizational** Publications

Add

FM 3-8..... Chemical Corps Reference Handbook

FM 3-10..... Chemical and Biological Weapons Employment

FM 3-12..... Operational Aspects of Radiological Defense

(S) FM 5-26A.. Employment of Atomic Demolitions (ADM)
(U)

FM 20-33..... Combat Flame Operations

FM 21-40..... Small Unit Procedures in Chemical, Biological, and Radiological (CBR) Operations

FM 21-41..... Soldiers Handbook for Chemical and Biological Operations and Nuclear Warfare

FM 101-40..... Armed Forces Doctrine for Chemical and Biological Weapons Employment and Defense

TM 3-215..... Military Chemistry and Chemical Agents

TM 3-220..... Chemical, Biological and Radiological (CBR) Decontamination

TM 3-366..... Flamethrower and Fire Bomb Fuels

By Order of the Secretary of the Army:

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The Adjutant General.

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USACDCADA (16)	USAWC (12)
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USACDC (5)	PMS Mil Sch Div Units (2)
USAMC (5)	MAAG (5)
ARADCOM (2)	Mil Msn (3)
ARADCOM Rgn (2)	

NG: State AG.(3); units—same as Active Army except allowance is one copy to each unit.

USAR: Units—same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-50.

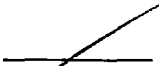
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FIELD MANUAL }
No. 31-10

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., 14 August 1962

BARRIERS AND DENIAL OPERATIONS

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 This manual supersedes FM 31-10, 30 April 1956, including C 1, 29 August 1957, and C 2, 9 October 1959.

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CHAPTER 1

INTRODUCTION

1. Purpose and Scope

This manual establishes Army doctrine for the employment of barriers and denial operations in a theater (area) of operations, as discussed in FM 100-5 and FM 100-15, and is designed primarily for use by army component commanders and their staffs. It sets forth employment responsibilities and covers the principles, planning considerations, and tactical applications of barriers and denial operations at various command echelons.

2. Improvement of the Manual

Users are encouraged to submit recommended changes or comments to improve this manual. Comments should be submitted on Department of the Army Form 1598 together with reasons to insure complete understanding and evaluation. Forward comments to Director, Combined Arms Combat Development Agency, Fort Leavenworth, Kan.

3. Application

Application of the doctrine and concepts contained in this manual is governed by the following considerations:

a. The trend toward mechanization in modern armies and the increased speed and tempo of combat operations makes the effective use of barriers essential. The employment of barriers, including the proper use of mines, is one of the more important means available to the commander for reducing the tactical mobility of the enemy.

b. Extensive barriers, are based on overall plans prepared by corps and field army.

c. In the forward portion of the combat zone tactical mobility is essential to successful combat operations. Occupation of terrain by a unit may be limited to a few hours and will seldom exceed a few days. Extensive minefields cannot be economically laid and cleared in time to permit the tactical mobility required. Thus, they are seldom used except where they can be emplaced prior to commencement of hostilities or as a part of a planned retrograde operation. Reliance is placed on obstacles which can

be constructed and cleared quickly and on supporting fires to reduce the enemy's mobility and, relatively speaking, increase that of the friendly forces. Even though men with weapons can restrict enemy movement without barriers and obstacles, available forces will often be inadequate for effective control of an area without such assistance or it may not be feasible to place sufficient men and weapons in the area. Mines will, however, habitually be used for blocking access routes, avenues of approach, and defiles, as well as to assist in perimeter security. In the forward portion of the combat zone mines usually are installed and removed by hand. As a general rule, mechanical minelaying equipment is not used.

d. In the rear portion of the combat zone or prior to the initiation of hostilities extensive barriers may be employed, including the large scale use of barrier minefields. They assist in limiting deep enemy penetrations or wide envelopments. The width and depth of these barriers depends upon their purpose, the tactical situation, natural obstacle value of the terrain, and the availability of time, labor, materials, transportation, and equipment. Minefields are laid by mechanical minelayers where possible, and are emplaced in such a manner as to gain surprise and deception.

4. Relationship Between Barriers and Denial Operations

a. A barrier is a coordinated series of natural and artificial obstacles employed to canalize, direct, restrict, delay, or stop the movement of an opposing force, and to permit friendly forces to impose additional losses in personnel and equipment upon the opposing force. It normally links obstacles in a linear form although it is not, at least initially, an impenetrable line of great depth and continuous strength. As a minimum, one major obstacle is presented to an enemy attempting to pass through the barrier at any given point.

b. A denial operation is designed to prevent or hinder the enemy's use of or benefit from area, personnel, facilities, or material. It may include destruction, removal, contamination, or erection of obstructions. Denial operations are basically strategic in concept.

c. Both barriers and denial operations have as their common objective the reduction of the rate of advance and the diminution of the combat power exerted by the enemy against our forces. Barriers are designed to hinder the movement of enemy close combat elements, whereas denial operations are aimed at hindering his overall ability to move his forces and to conduct operations. The effectiveness of barriers in achieving their objective is readily understandable to the small unit commander, since their

effect in holding up the enemy is obvious, and they give immediate relief to the most forward elements. The effectiveness of denial operations may not be so obvious. For example, the benefits of blowing up a railroad bridge across an unfordable river are immediately apparent, but the benefits of removing or destroying all the locomotives in a railway system being abandoned to the enemy are not. Most bridges, however, can be replaced in a matter of days or a week at most, whereas a shortage of locomotives may hinder an enemy's operations for months or even years. The successful employment of barriers and the execution of denial operations are dependent on sound planning, the exploitation of natural terrain obstacles, and the effective use of available resources. Both barriers and denial operations must be closely coordinated with all tactical plans.

CHAPTER 2

BARRIERS—PLANNING

Section I. AUTHORITY AND RESPONSIBILITY

5. Authority

Corps and higher commanders are authorized to direct the employment of barriers on an extensive scale. This authority may be delegated to division and comparable commanders. All commanders use natural and artificial obstacles for security, the strengthening of close-in defenses, and for organization of the ground. The communications zone commander may direct barrier systems to counter airborne, amphibious, or guerrilla threats. This authority may be delegated to area commanders.

6. Staff Responsibility

General and special staff responsibilities for planning and supervising the employment of barriers are outlined in general terms in FM 101-5.

7. Construction Responsibility

a. Combat Units. Construction of obstacles for close-in defense and security is the responsibility of the unit commander. These obstacles may be integrated into the barrier plan of a division or higher command. Ordinarily each tactical unit constructs that part of the barrier system that lies within its area of responsibility. Engineer assistance in the form of technical advice and supervision normally is furnished the unit as needed.

b. Engineer Units. Engineer units are responsible for—

- (1) Furnishing technical advice and supervision.
- (2) Siting and constructing specific individual obstacles and/or barriers which—
 - (a) Require special skills and equipment.
 - (b) Protect exposed flanks or rear.
 - (c) Benefit the command as a whole.
 - (d) Must be prepared before the arrival of the troops who are to occupy the area.
 - (e) Lie outside of the area of responsibility of any particular unit.

- (3) Estimating requirements for obstacle materials.
- (4) Recommending the location of and establishing engineer army supply points to support barrier construction.
- (5) Recommending the allocation of engineer troops to assist combat units and to construct barriers.
- (6) Recommending the allocation of organic transportation of engineer units to assist in hauling barrier materials.

c. Other Technical Service Units. Barrier construction responsibilities of other corps or field army technical service units are as follows:

- (1) Chemical Corps responsibilities include estimating requirements for and recommending the allocation of munitions filled with chemical, biological, and radiological contaminants including napalm and smoke; recommending the location of and establishing chemical army supply points to support barrier construction; and recommending the allocation of chemical units to assist in the contamination of barriers, obstacles, facilities, and areas.
- (2) Ordnance Corps responsibilities include procuring and issuing antitank and antipersonnel mines, explosives, trip flares, and related materials; and recommending the location of and establishing ordnance army supply points to support barrier construction.
- (3) Quartermaster Corps responsibilities include procuring and issuing gasoline and the necessary containers used by chemical units for manufacturing napalm mixture.
- (4) Signal Corps responsibilities include providing communications to the executing party stationed at or near those obstacles vital to the plans of a higher command and reserved for destruction by that commander.
- (5) Transportation Corps responsibilities include transporting barrier materials forward by highway, rail, water, or air within allocations (or priorities).

d. Division Support Commands. The responsibilities of the division support command in barrier and obstacle construction include—

- (1) Establishing class IV obstacle construction materials supply points in the division's area of responsibility.
- (2) Procuring and issuing class IV obstacle construction materials.
- (3) Supplementing field army transportation in hauling class IV obstacle construction materials into the division's area of responsibility when required.

- (4) Procuring and controlling the issue of class V obstacle materials, i.e., mines, fuzes, explosives, and related items.
- (5) Supplementing unit transportation in hauling class V obstacle materials when required.
- (6) Establishing mines and explosive dumps when required.

Section II. PLANNING CONSIDERATION

8. Planning Factors

The employment of barriers is integrated into the scheme of maneuver, fire support, and combat service support plans. The following factors are among those considered in the employment of barriers:

- a.* Mission of the command.
- b.* Avenues of approach.
- c.* Terrain, especially natural obstacles and built-up areas of masonry construction.
- d.* Weather conditions materially affecting the terrain, the use of atomic demolitions munitions, and chemical, biological, and radiological contaminants.
- e.* Composition, disposition, capabilities, and limitations of both enemy and friendly forces.
- f.* Limitations imposed by higher headquarters.
- g.* Barrier instructions and denial plans of higher headquarters.
- h.* Time, labor, materials, transportation, and equipment available.

9. Planning Barrier Location

a. A barrier system is a coordinated series of related barriers which are linked to each other, usually in a cellular arrangement. Within a barrier system, individual barriers are so located as to make maximum use of all natural barriers. Natural barriers are as important as observation, fields of fire, communications, and concealment since they determine, to a considerable degree, the strength of a barrier system. Natural barriers aid in blocking an enemy approach and may force him to either move slowly and laboriously through the natural barrier or seek a bypass. This may permit the concentration of friendly fires in defense of the more trafficable terrain approaches while covering natural barriers with reduced forces. Locating barriers along streams, ridges, swamps, lakes, and similar natural obstacles and linking them with artificial obstacles reduces the resources required to achieve a network of barriers, thus increasing the natural compartmentation of the terrain.

b. In a defense in depth, barriers are located on avenues of approach to assist in controlling key terrain. Intermediate barriers and obstacles are so located as to delay, canalize, or confine penetrations of the forward barrier and to provide depth to the barrier system. Sufficient fire-protected, obstacle-free areas must be provided so that interference with the movement of friendly forces, counterattacks, rear defense areas, reserve assembly areas, and combat service support activities is held to a minimum.

c. Artificial obstacles are located where natural obstacles or barriers are nonexistent, consistent with the mission and resources available. The types of artificial obstacles used are carefully selected to fit the terrain.

d. Barriers in the forward portion of the combat zone are located so that they can be covered with flat trajectory fires. If this is not practicable, they are sited so that they can be covered with airbursts of artillery or mortar fires.

e. Barriers in the rear portion of the combat zone are sited so that they can be covered with artillery fire or kept under surveillance. Adequate communications and plans for rapidly shifting forces and supporting fires to the threatened area are provided.

f. Where possible, individual obstacles within barriers are located so they are under friendly observation but defiladed from enemy observation. This aids surprise and deception.

g. It is not always necessary that barriers be located where they are more difficult to bypass than they are to breach. If the tactical purpose of the barrier is to canalize enemy movement, the barrier is located so that the enemy will have greater difficulty in breaching it than in bypassing it.

10. Depth

a. *Obstacles.* Any single obstacle may be surmounted; however, a series of coordinated obstacles in depth constitutes a formidable barrier. The combat echelons of modern armies have high cross-country mobility, particularly in their armored and mechanized elements. Their support echelons move mainly on roads and railroads. The employment of obstacles in depth along communication routes between barriers may separate enemy combat echelons from their supply sources and contribute materially to his defeat. Route mining and demolitions along favorable avenues of approach may compel the enemy either to deploy repeatedly thus slowing his advance, adopt less favorable routes, or to accept prohibitive casualties. Plans for use of these intermediate obstacles, particularly route mining, must consider the effect on future friendly operations.

b. Barriers. Barriers must be employed in depth if they are to endure. The tremendous destructive power of nuclear weapons makes it possible for an enemy to penetrate any single barrier and defense. The maintenance of strong defense garrisons in the rear portion of the combat zone to prevent the enemy from exploiting breakthroughs usually is not practicable. Successive barriers in a cellular pattern combined with intermediate obstacles in depth will slow or limit enemy penetrations; permit greater relative freedom of maneuver by friendly forces; and provide time for the defenders to regroup and counterattack. Successive barriers require the enemy to expend strength and time at each barrier and may compel him to concentrate and thus offer lucrative targets for massed artillery fires or nuclear weapons. The width and depth of a specific barrier is not fixed but is dependent on its purpose, the tactical situation, and the resources available. The distance required between barriers for limiting deep penetrations is an important consideration. If the barriers are located too close together they become one barrier rather than two, and if located too far apart they permit the enemy to consolidate his gains before assaulting the next barrier. Although the specific location of the barriers is dependent upon terrain, as a general rule they should be far enough apart to allow reserves time to counterattack.

11. Priorities

a. Operational requirements and logistical capabilities are the keynotes in establishing priorities for barrier construction and for determining those elements to be deferred, curtailed, or eliminated. The commander decides whether or not the barrier requirements are commensurate with the results to be expected. Seldom does the commander have enough time, labor, materials, transportation, or equipment available to construct all barriers desired. Therefore, the feasibility of the barrier plan must be evaluated against all tactical and logistical requirements. This is particularly true in the defense because of the requirements generated by the construction of field fortifications, organization of the ground, combat service support operations, and related tasks.

b. Within the overall priority accorded the barrier system, individual barriers are placed in order of priority for construction as determined by their contribution to the accomplishment of the unit's mission. Generally these priorities are from front to rear with first priority normally assigned either to covering and forward barriers, or to those barriers which protect a critical flank

or block the most dangerous enemy avenue of approach. In the defense, the rear barrier normally receives the second priority.

c. Within each individual barrier, individual obstacles are placed in order of priority with first priority given to those which offer the greatest contribution to the success of the operation. Usually, the improvement of natural obstacles and the construction of positions to cover them by fire are the most economical in terms of resources expended; are the most rewarding in results; and therefore, receive first priority for accomplishment. Second priority is usually given to the construction of artificial obstacles to link the natural obstacles into a barrier.

d. The development of a barrier system is phased with each element designed and constructed to provide time for the construction of succeeding portions of the system. In many instances, however, individual obstacles, particularly demolitions, are not executed until the enemy closes on the obstacle or penetrates the battle area. Thus, the effort available for completing succeeding portions of the barrier system tends to become less and less because of the requirement for demolition firing parties and demolition guards for those obstacles not executed immediately.

e. An optimum or ideal barrier system in the forward portion of the combat zone is rare except where natural barriers are completely effective by themselves or require little improvement or augmentation with artificial obstacles. Conversely, extensive barriers are both practicable and necessary in the rear portion of the combat zone to help block deep penetrations and envelopments; to assist in forming massed targets; or to provide time and space for the maneuver of counterattack forces.

12. Flexibility

Barrier planning is continuous. Because of the many variables involved, barrier plans must respond to changing situations. The weather, labor, and tactical situation that exists when a specific barrier plan is executed may differ widely from that originally envisioned and have a pronounced effect on the availability of resources for barrier construction. A detailed barrier plan, worked out in advance, may become unusable because of changing enemy tactics or the introduction of additional enemy troops or new equipment into the battle area. Each barrier plan is reviewed constantly in the light of changing tactical concepts, situations, and capabilities of both enemy and friendly forces, as well as changing weather conditions. Barrier planning provides for expansion of the barrier system as additional time, labor, materials, transportation, and equipment become available. This is particu-

larly true in the forward portion of the combat zone where time and labor are at a premium and initial construction of barriers is likely to be limited to the strengthening of natural obstacles and the fabrication of only a few essential artificial obstacles.

13. Logistics

a. General. The logistical support required for construction of an extensive barrier system demands careful and detailed planning and close staff coordination.

b. Materiel, Transportation, and Equipment. Because of the large amounts of material, transportation, and equipment required for barrier construction, logistic staff planners must participate in barrier planning from the inception of the operation so the necessary items can be requisitioned, shipped forward, stocked in the depots and supply points, and be available when required. In some instances special arrangements with higher headquarters or with the supporting logistical command in the communications zone may be necessary.

c. Labor.

- (1) A factor critical to the execution of a barrier plan is the availability of labor. All sources of manpower, including the local population, are exploited. Substantial effort is required of the forward combat units and tactical reserves, particularly for strengthening natural obstacles. This permits available engineer troop effort to be used on more specialized tasks.
- (2) Within a division area the division engineer battalion coordinates all engineer and non-engineer troop labor as well as any local labor involved in barrier and obstacle construction. It furnishes tools, materials, and supervision for all labor forces within the division's area of responsibility. Corps and army engineer units may support the divisions in siting, preparing, and installing major barriers.
- (3) Mobile labor units, using military cadres and local laborer fillers, are formed into paramilitary organizations and used for much of the barrier construction in the rear areas; however, the size of the force which can be employed effectively may be limited by the number of qualified military personnel available for supervision. Portions of a barrier system in areas not under friendly control may be constructed by friendly guerrilla forces.

d. Logistic Factors. Logistical planning factors for estimating time, labor, materials, and transportation requirements for barrier

construction are found in part I, FM 101-10. Actual requirements can be determined only after a detailed reconnaissance has been made to determine the number and type of individual obstacles required. The resources required for barrier construction are such that logistical planning must be accomplished long before the exact number and type of obstacles are known. The planning factors in FM 101-10 permit order of magnitude computations so resources can be obtained in time.

Section III. PLANNING BARRIERS

14. Relationship Between Barrier Studies and Barrier Plans

a. General. Barriers are planned and developed in two different but related phases according to the level at which the planning is being conducted. Normally, at army group and higher headquarters, broad barrier studies are made as a part of long-range planning. At field army and lower echelons, barrier plans are made as a part of normal operational planning. Although a barrier study and a barrier plan are closely related they differ in purpose, scope, content, and degree of finality.

b. Barrier Study. A barrier study is a study of the terrain in a specific area to determine the most effective use of natural and artificial obstacles. The study is based upon a broad concept of future operations to be conducted in the area; recommends specific barriers and obstacles, priorities, and allocation of tasks; and forms a basis for developing barrier plans. The study is explanatory in nature and points out the potentialities of an area for retrograde, defensive, or offensive operations correlated with a barrier system. The barrier study presents conclusions and recommendations for the best use of the terrain in a barrier system, provides a basis for developing tactical and logistical concepts and plans to be applied in the area, and is a framework around which a barrier plan can be built. It is a complete, carefully prepared, detailed study.

c. Barrier Plan. A barrier plan is that part of an operation plan (order) which is concerned with the employment of obstacles to assist in accomplishing a specific mission. A barrier plan, as compared to a barrier study, is limited in scope and is more definitive. It is based upon actual tactical concepts adopted, which may or may not be those recommended by the barrier study. It supports tactical plans and is carefully integrated into all operations so as to avoid conflict with fire support and maneuver plans. A barrier plan is normally issued as an annex to the operations

plan (order). A general format for a barrier plan annex with sample appendices is contained in appendix III.

15. Scope of Barrier Planning

Barrier planning is accomplished at all levels and for all types of tactical operations just as fire support plans are developed for all tactical operations. All commanders plan for and make maximum practicable use of barriers unless restricted by higher headquarters. Barrier lines prescribed in the barrier plans of major commands represent a general trace joining the major natural obstacles astride avenues of approach which the commander determines must be blocked to support his planned operation. The designated barrier lines are essentially a coordinating device for subordinate commands who locate and determine the specific obstacles required. The eventual result of barrier planning is the development of a detailed barrier system for a specific area and for a specific operation. Barrier planning may be accomplished concurrently or successively, usually the latter, by the various command echelons. Barrier plans do not include, necessarily, all barriers and obstacles needed by subordinate units.

16. Department of Army

Department of Army prepares broad barrier studies covering large geographical areas. These studies develop general barrier systems as well as broad planning factors for forecasting materiel, transportation, and manpower requirements. They may recommend tactical concepts for specific areas. The studies primarily test the feasibility of a proposed system in the light of tactical forces and materials likely to be available, and measure the impact of the system on logistical planning and on industry.

17. Theater of Operations

Theater barrier studies are as broad in scope and area as Department of the Army barrier studies. They may be based on a general reconnaissance of the area in addition to terrain studies, maps, and aerial photographs. Theater barrier studies indicate general barrier systems and broad concepts of operations so that the theater commander, who is vitally interested in the impact of a barrier system on logistics planning, can secure the required material and equipment and provide facilities for receipt, storage, allocation, and distribution of the items.

18. Army Group

Army group barrier studies are more detailed, tend to shape specific tactical concepts for the area of operations, and provide a

framework for the barrier plans made by the field army. Army group barrier studies are influenced directly by the disposition, strength, and capabilities of enemy forces in the area. They outline the nature and scope of the barrier system, assign areas of responsibility, and allocate materials.

19. Field Army

a. General. Barrier planning is a major function of the field army. General traces of individual barriers within the barrier system, policies, instructions, and directives, usually based on barrier studies and directives of army group and higher headquarters, are formulated. At field army the strategic denial plan of higher headquarters is combined with the barrier plan into a single, comprehensive, coordinated plan for the employment of barriers and the conduct of denial operations within the field army area.

b. Barrier Plan. Initially, the field army barrier plan is not a detailed plan showing all of the individual obstacles or barriers in the army's sector. It is a framework around which its subordinate commands form their own barrier plans. The field army (corps, division) plan usually includes—

- (1) Applicable portions of the barrier studies, instructions, or plans of higher headquarters, including pertinent portions of denial plans.
- (2) Designation of any specific barriers vital to the command as a whole with detailed instructions relating to their construction and execution.
- (3) The general location of the barriers to be constructed. This assures continuity of the barriers and their establishment in depth. Barrier lines are designated either by general trace or a series of coordinating points. Exact locations and specific obstacles are determined by subordinate commanders after conducting detailed ground and air reconnaissance and after considering their specific tactical dispositions and plans.
- (4) The assignment of areas of responsibility and specific tasks in priority to subordinate units to include, when appropriate, specific denial targets.
- (5) When important to the command as a whole, the location and type of specific obstacles, including minefields of strategic or major tactical importance. (Specified obstacles usually are indicated by appropriate symbols on the barrier location overlay or listed in the mission subparagraphs of the barrier plan annex. Normally, specific

types of obstacles are determined within the division. By specifying a minimum of obstacles by type, the larger unit commander permits his subordinate commanders maximum latitude in accomplishing the barrier plan.)

- (6) Code numbers of specified obstacles and code numbering system(s) for designating those individual obstacles specified by subordinate units. (This may be prescribed by SOP. Appendix II outlines a system of numbering artificial obstacles.)
- (7) When deemed necessary, specific completion times for all or any portion of the barrier system; however, completion times can be specified later.
- (8) Code system(s) for reporting the state of readiness of the individual obstacles, i.e., proposed (P), under preparation (U), ready but passable (R) and executed (E). (This may be prescribed by SOP.)
- (9) Gaps, lanes, important routes to be kept open, and areas important to the command for tactical and combat service support operations as well as future operations. (Gaps and lanes are specifically designated at the lowest level practicable in consonance with the mission of the command concerned. For example, the field army normally cannot designate gaps or lanes in the division areas adequately and should not attempt to do so. The corps can do this. The field army designates gaps and lanes in the corps rear areas for the movement of the army reserve, the relocating or shifting of units under army control, for combat service support activities, and for future operations.)
- (10) Coordination required between adjacent units to insure that critical points, such as common boundaries are effectively covered, that gaps and lanes are properly located, sufficient in number, and will not be closed too soon.
- (11) When deemed advisable and when desired by subordinate commands, authority for the construction of additional barriers.
- (12) Limitations or restrictions on the employment of certain artificial obstacles by type or area, such as minefields, nuisance mines, and boobytraps; chemical, biological, or radiological contamination; and atomic demolition munitions. (To guard against premature execution, restrictions may be placed on the employment of artificial obstacles by requiring higher headquarters approval for the closure of specific gaps and lanes or by requiring

clearance or release of control over specific routes before bridges and other transportation facilities are destroyed. The larger unit commander maintains surveillance over tactical operations and removes any restrictions imposed on the execution of obstacles as early as possible to allow subordinate units maximum freedom to conduct their operations. Restrictions on the use of minefields, nuisance mines, or boobytraps may be necessary to prevent undue interference with future operations and reduce casualties and loss of equipment.)

- (13) Limitations on and conditions for the destruction of facilities with strategic importance, such as locks, dams, major bridges, and tunnels.
- (14) Instructions regarding the submission of detailed barrier and obstacle plans for approval.
- (15) Allocation of engineer support, labor (both troop and local), materials, transportation, and equipment.
- (16) Restrictions, if any, on the use of local labor.
- (17) Instructions on the security of the barrier plan.
- (18) Reporting instructions. (Through reports, all headquarters in the chain of command keep abreast of the barrier situation and plan the conduct of their operations accordingly.)
- (19) Appendices, when and as required. (Important ones are Minefield Location Plan; Demolition Plan; Chemical, Biological, and Radiological Contaminants Plan; and Atomic Demolitions Plan. These appendices establish the conditions under which each obstacle will be prepared, defended, and executed.)

20. Corps

a. The corps barrier plan is based on the corps tactical plan and the field army barrier plan. It is similar in content to that of the field army plan (par. 19b), contains pertinent portions of the field army plan, and adds any barriers required for corps operations. It is more comprehensive than the field army plan because it is based on a better knowledge of the area and the study of detailed terrain analyses, maps, and aerial photographs. As a result, barrier traces usually are well defined.

b. Although the corps barrier plan usually specifies a larger number of specific artificial obstacles by location and type, such as minefields and demolitions, than does the field army plan, most of the detailed planning is accomplished by major subordinate units, i.e., the divisions, armored cavalry regiments, and engineer

brigades and groups. Overprinted maps or overlays are included in the corps barrier plan in sufficient detail so that subordinate units understand exactly the barrier lines to be installed. When appropriate, detailed plans for conventional demolitions; atomic demolitions, chemical, biological, and radiological contamination; and minefields are prepared. Corps coordinates the detailed planning of its subordinate units including their use of supporting weapons to cover the barriers with fire.

c. Corps integrates the maneuver, barrier, and fire support plans thoroughly since the corps fights the tactical battle for the field army. This includes planning the fires of the corps artillery so that they cover important barriers after the troops actually defending them have withdrawn. When tactical air support is available, corps also plans its use to cover barriers with fire.

21. Division

a. Division barrier plans cover the same items as do the field army and corps plans (par. 19b), reduced to specifics. They include applicable portions of the corps plan, and add any barriers and obstacles required for division operation.

b. The division makes a detailed reconnaissance of its area of operations and determines the exact trace of barrier lines, specifies the location and type of artificial obstacles best suited to the terrain, designates gaps and lanes, assigns target code numbers, prepares detailed bills of materials, and estimates the time, labor, transportation, and equipment required. Where the division plan cannot be specific, subordinate units are directed to determine and report the remaining details. Based on the complete plan, the division determines whether or not the location and type of obstacles suit the tactical scheme of maneuver and overall fire support plan. Where conflict or disagreement occurs, the barrier plan, the fire support plan, the tactical scheme of maneuver, or all three, are modified as necessary to bring them into consonance. When coordination is complete, the information on each obstacle is consolidated, incorporated into appendices to the barrier plan, and forwarded to corps. There it is reviewed, coordinated, approved, consolidated, published as appendices to the barrier plan, and forwarded to field army. The final barrier plan of each headquarters consists of a detailed plan, including the exact location and type of each obstacle and the unit responsible for its construction, security, and execution. This knowledge is essential at all levels because troop units may be rotated or shifted and obstacles, once in place, restrict friendly as well as enemy movement.

c. As obstacles are constructed and executed, status reports are made through command channels. Detailed information on the location of each obstacle combined with the status reports keeps each level of command abreast of the situation. Each headquarters is responsible for maintaining this information in a current status and for keeping interested agencies informed.

22. Brigades, Regiments and Groups

a. Much of the detail of a barrier plan is determined by brigades, regiments, and groups as they usually perform the detailed terrain reconnaissance and physically locate the artificial obstacles on the ground. They normally commence construction of individual obstacles, within authorized limits, without waiting for completion or approval of the barrier plan. The construction of barriers and the development of barrier plans are both carried out simultaneously. Both continue as long as the area is occupied. Appropriate reports are submitted at the start of construction, completion of construction, and final execution of each obstacle. In the case of minefields, a report of intent to lay is also required.

b. Complete barrier plans are not carried forward of division headquarters because of the danger of compromise. Extracts of the plan in the form of fragmentary orders, overlays, and sketches are normally provided to the subordinate units.

c. Information contained in brigade, regiment, and group barrier plans includes—

- (1) Exact location and type of each obstacle by code number, including those specified by higher headquarters.
- (2) A timetable and priority of construction for each obstacle.
- (3) Labor and materials required for each obstacle.
- (4) Specific assignment of units for construction, defense, and execution of each obstacle.
- (5) Specific orders stating under what conditions and by whose authority each obstacle is executed.
- (6) Routes to be kept open in accordance with the tactical and logistical plan, including those specified by higher headquarters.
- (7) Exact location and extent of gaps and lanes, including those specified by higher headquarters.
- (8) Coordination accomplished with other headquarters.

CHAPTER 3

INDIVIDUAL OBSTACLES

Section I. OBSTACLE CHARACTERISTICS AND EFFECTS

23. General

a. An obstacle is any obstruction that stops, delays, or diverts movement. Obstacles may be natural: steep slopes, rivers, gullies, swamps, heavy woods, jungle, deep snow, and certain manmade terrain features such as cities, towns, embankments, and canals; or they may be artificial: demolished bridges, road craters, abatis, artificially flooded areas, minefields, contaminated areas, barbed wire entanglements, antitank ditches, and log, steel, and concrete structures. Obstacles are the backbone of a barrier system, since each barrier is a coordinated series of obstacles. The quantity and type of artificial obstacles constructed is limited only by the time, labor, material, transportation, and equipment available plus the ingenuity of the constructing unit. The nature of the principal enemy threat—infantry, armor, mechanized, airborne, amphibious, or any combination thereof—determines the character of the obstacles organized into a barrier. Integrated obstacles designed to impede both armor and infantry are more effective than either antivehicular or antipersonnel obstacles employed separately.

b. Counterinfiltration (security) measures to preclude enemy breaching or removal of obstacles are essential if they are to accomplish their purpose because generally it takes less effort and time to surmount an obstacle than to construct it. To be effective, obstacles should be covered by fire or kept under surveillance so that fires or mobile forces can be shifted either to counter enemy efforts to breach the obstacles or destroy the enemy while entrapped. When it is necessary to cover obstacles with indirect fires, airbursts are employed since ground impact bursts may destroy the effectiveness of the obstacles.

Section II. NATURAL OBSTACLES

24. General

The location and characteristics of natural obstacles have a direct relationship on the general plan of operation and the posi-

tioning of forces. The desired characteristics of a natural obstacle are ease of conversion into a more effective obstacle with a minimum expenditure of effort, materials, and time; defilade from enemy observation; location where observation and defensive fires can prevent enemy breaching; and difficulty of bypassing. Several of the major types of natural obstacles are discussed separately below although it must be recognized that they seldom occur separately; therefore, the combined effects of two or more must be considered. The most effective natural obstacles against tanks are steep slopes, unfrozen swamps, and broad, deep streams. Time, labor, and materials usually can be saved by improving less effective natural obstacles rather than constructing artificial ones to serve the same purpose. Although not discussed specifically below, rice paddies, lava fields, and areas characterized by sinks, subterranean water courses and caverns, can be formidable obstacles. Their omission is not intended to deprecate their significance. For a complete discussion of terrain see FM 30-10.

25. Steep Slopes

Varying degrees of steepness are required to stop different types of vehicles. Tanks can negotiate slopes as steep as 60 percent. Conditions which make slopes less than 60 percent impassable are trees, unfavorable soil conditions, large rocks and boulders,



Figure 1. Steep slopes and mountainous terrain are obstacles to wheeled and tracked vehicles. Snow and ice decrease their obstacle value.

and other natural features which, if located on level ground, do not hinder movement appreciably but which become obstacles when combined with slope. The movement of infantry also is adversely affected by steep slopes since movement is slower and the troops tire more rapidly (fig. 1). The obstacle characteristics of slopes are enhanced by the use of road craters, mines, abatis, and artificially induced landslides.

26. Escarpments

Escarpments are a formidable obstacle to both vehicles and personnel if over one and one-half meters in height.

27. Ravines, Gullies, and Ditches

Generally ravines, gullies, and ditches are obstacles to wheeled vehicles. When over five meters in width, they usually are effective against tracked vehicles.

28. Rivers, Streams, and Canals

The major obstacle value of rivers, streams, and canals is that they must be crossed by special means, either deepwater fording, surface, or aerial. The ease of crossing by deepwater fording and surface means is determined by the width, depth, velocity, and bank and bottom conditions. A river over 150 meters in width and over one and one-half meters in depth is a major obstacle; however, the presence of bridges and fords limits their obstacle value. The first step in enhancing the obstacle value of rivers, streams, and canals is, therefore, the destruction of all bridges or means of passage over them. Approach roads are cratered and mined, ferry slips and boats are destroyed, and, as time permits, other artificial obstacles of all types are emplaced in the stream and on both banks. Even after the enemy has ferries and bridges in operation, his movement is canalized making him vulnerable to artillery or air attack. The obstacle value of fordable rivers, streams, and canals should not be overlooked. On fordable water obstacles, the character of the banks and bottoms has a significant bearing on fording operations. Often a ford may be negotiated with little difficulty by the first few vehicles but the remainder cannot cross because the trafficability of the bottom or entrance and exit slopes has been destroyed. Velocity of the water obstacle also may be a limiting factor because the height of the wave the vehicle causes to be thrown upstream may be sufficient to swamp or flood the vehicle.

29. Lakes

Lakes are usually unfordable and unbridged and must be bypassed. Large lakes may be crossed using amphibious vehicles or boats. Beach and underwater obstacles are used to increase the obstacle value of lakes. The obstacle value of lakes, as well as other water obstacles, may be reduced in whole or in part by freezing.

30. Swamps and Marshes

The chief obstacle value of swamps and marshes is the canalization of vehicular movement onto causeways making such movement vulnerable to air or artillery attack. Swamps and marshes over one meter in depth may be better obstacles than are rivers, since causeways are usually more difficult to construct than are bridges. Most swamps and marshes can be crossed by foot troops but the physical effort required tires the men rapidly. All roads and causeways through swamps and marshes should be extensively cratered, mined, or if the swamp or marsh is wooded, blocked by abatis.

31. Forests

Temperate zone forests tend to canalize movement since the roads, trails, and firebreaks through them provide the only means for rapid movement. The factors which contribute to the obstacle value of a forest are tree size and density, soil condition, slope, and depth. Forests with trees 20 centimeters in diameter are tank obstacles provided the individual trees are sufficiently close to prohibit movement between them; however, in most wooded areas individual trees of this size are seldom near each other. Closely spaced trees usually are of relatively small diameters. When pushed over by a tank, they may create a mass of vegetation sufficient to stop a tank. On slopes of 20 percent and greater, trees as small as 10 centimeters in diameter will slow and may stop tanks. Tree stumps 45 centimeters high are obstacles to tank movement. Seldom is undergrowth in temperate zone forest dense enough to seriously impede the movement of infantry; however, foot movements may be slowed by such factors as steep slopes, adverse soil conditions, and fallen trees and branches.

The most effective way of increasing the obstacle value of forest is to construct abatis (fig. 2) and craters, place mines along the roads, trails, and fire breaks, and to create forest blowdown with nuclear weapons. Log cribs, hurdles, and post obstacles may also be used since the materials required are readily available.

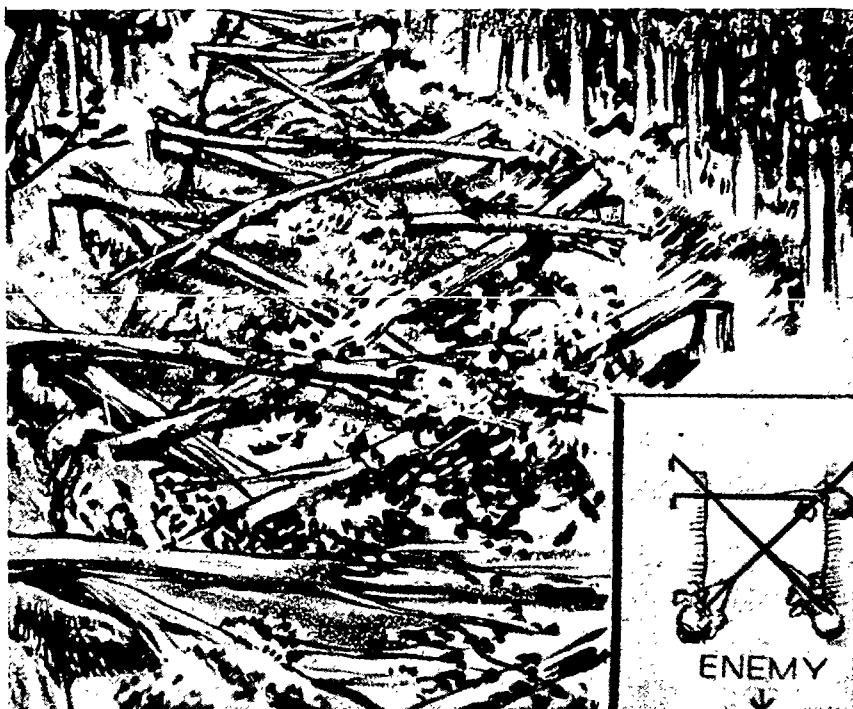


Figure 2. An abatis. One of the most effective obstacles to the movement of wheeled and tracked vehicles through forests.

32. Jungles

Tropical jungles are significant obstacles to the movement of vehicles and personnel. The ground between the trees is usually covered by interwoven vines, bushes, plants, or rotting vegetation, and is often swampy or marshy (fig. 3). Visibility is limited because of tangled undergrowth or the lack of light caused by overhead tree foliage. Routes of communication usually are meager or nonexistent. Trails are usually narrow and poor, becoming untrafficable under continued vehicular use. Rivers and streams have few bridges. Vehicles cannot operate satisfactorily unless routes have been previously prepared. Foot troops move with difficulty because the dense undergrowth often necessitates cutting their own trails. Since the jungle is an effective obstacle to movement, usually it is necessary only to block the roads and trails and mine the fords. Since streams and rivers often provide the best routes in jungles, antiboat obstacles also may be used successfully.



Figure 3. Jungle is a major obstacle to foot and vehicular movement.

33. Deep Snow

Snow is considered to be deep when it is over one meter in depth. It is mainly a problem in the arctic and the northernmost regions of the temperate zone. Deep snow also may exist in mountainous regions and other areas subject to severe winters. Deep snow is not always a permanent feature of the terrain but is a seasonal obstacle of opportunity. Often deep snow is accompanied by ice and intense cold. These conditions combine to provide an obstacle of major significance. Deep snow impedes movement of foot troops and vehicles (fig. 4). It blankets many terrain features, hiding such objects as boulders, rocky areas, ditches, small streams, and fallen trees which, combined with the snow, effectively hamper movement.

34. Deserts

Deserts are not obstacles in the sense that they seriously obstruct physical movement of military forces. Their obstacle value lies in the fact that vehicles must be specially equipped and drivers specially trained for desert operations. The principal artificial obstacles used in the desert are minefields since the soil in many areas permits easy digging and the winds quickly obliterate all traces of installation. Large minefields can be readily installed or shifted.



Figure 4. Deep snow is an obstacle to foot and vehicular movement and often requires special equipment.

35. Built-Up Areas

The obstacle value of a built-up area depends on its size, location, and type of construction. Large cities and towns with many buildings of masonry construction, located astride principal communication routes, can become obstacles of considerable importance because they can be reduced to rubble. Even if gaps are cleared through the rubble and debris, movement is still canalized. The natural obstacle value of built-up areas can be increased by cratering the streets, demolishing walls, overturning or derailing street or railroad cars, and constructing road blocks from steel rails, beams, and rubble. When reinforced with mines and barbed wire, such obstacles protect against armored, mechanized, and foot troops.

Section III. ARTIFICIAL OBSTACLES

36. General

Major types of artificial obstacles are discussed separately below; however, they normally are used in conjunction with natural obstacles and in combinations of two or more types of artificial obstacles. When artificial obstacles are used in barriers, and when practicable, a variety of such obstacles is used to promote effectiveness and as an aid to surprise and deception. Because of

the time, labor, materials, transportation, and equipment required, many types of artificial obstacles are not employed in quantity in the forward portions of the combat zone. Installation time and labor are usually the two most important factors governing the types and numbers of artificial obstacles constructed, therefore, the types employed are limited to those which can be completed quickly with locally available materials and which contribute most directly to the strength of the defense area. The use of mines may not be extensive because of the inherent restrictions on tactical mobility, the lack of time for installation, the shortage of labor, and the large burden placed on combat service support activities. Artificial obstacles employed in the forward portion of the combat zone consist, for the most part, of demolitions, hasty minefields of limited density, barbed wire entanglements around defense areas, improvised road blocks, tree blowdown, and some nuisance mining. The more obstacles the commander constructs, the less freedom he has in selecting the time and place for employment of his reserve. This is remedied by carefully planning gaps and lanes in the barriers and by carefully coordinating the barrier plan with other tactical plans. In rear barriers directed by corps and field army and constructed by corps and field army units, all types of artificial obstacles are employed extensively, including minefields of great density. For a discussion of artificial obstacles and their employment, other than mines and demolitions, see FM 5-15.

37. Mines and Minefields

a. General. Mines and minefields are both weapons and obstacles and should be exploited to the fullest extent practicable. As weapons they cause casualties; as obstacles they canalize, divert, restrict, delay, or stop movement. Mines are one of the best types of artificial obstacles because they are portable and constitute a great hazard to the enemy. Comparatively speaking, they are easily and quickly installed and camouflaged and can be used to support all types of combat operations. Mines once laid are a hazard to both enemy and friendly forces until removed or made ineffective.

b. Classification. Mines are classified as either antipersonnel or antitank. Minefields, which are areas containing mines laid with or without pattern, are classified as antipersonnel, antitank, or mixed. An antipersonnel minefield is one laid primarily for protection against infantry attack and consists of antipersonnel mines only. An antitank minefield is one laid primarily for protection against armor attack and consists of antitank mines with a low ratio of antipersonnel mines. A mixed minefield is one laid for

protection against both infantry and armor attack and contains both antitank and antipersonnel mines in considerable density. Mixed minefields are the most common type employed since they protect against both threats. In addition to type of mine employed, minefields also are classified according to the function they perform, i.e., protective, defensive, barrier, nuisance, and phony. For a complete discussion of mines and minefields, see FM 20-32.

c. Mine Warfare Policy. Mine warfare policy at each command echelon must be consistent with the overall concept of operation, probable future missions, and available resources. Commanders may limit the employment of mines by subordinate units by restricting or revoking authority to employ certain types of mines or their use in specified areas. Restricting the employment of mines combined with a requirement for higher commanders to delegate authority for the installation of certain types of minefields is normal. This guards against the conduct of extensive mine warfare without the knowledge and consent of the commander responsible for large scale maneuver. Failure to provide the subordinate commander with proper guidance to include necessary restrictions may jeopardize future operations as well as place an undue burden on combat service support activities. Unless cogent reasons for restrictions exist, subordinate commanders normally are permitted to use mines and minefields within their available resources to economize on forces, strengthen defense areas, and delay or disrupt enemy movement.

d. Methods of Employment. There are two methods of laying and installing minefields—deliberate and hasty. Deliberate minefields are minefields laid according to a standard pattern with the mines buried. Hasty minefields are minefields laid without pattern usually with the mines unburied but camouflaged to the maximum practicable extent. For details of deliberate and hasty installation of minefields see FM 20-32A (when published).

e. Protective Minefields. A protective minefield is one which is simple, shallow in depth, or narrow in frontage and is employed to assist in the local close-in protection of small or limited areas. They are employed in both the forward and rear portions of the combat zone or in isolated locations such as detached posts, outposts, working parties, or road block defense parties. Antitank, antipersonnel, and flame mines, as well as trip flares may be used. Generally, protective minefields are laid on short notice for a short duration using mines from the unit's basic load or local stocks and must be readily removable by the installing unit. Small nonmetallic mines, antilift devices, special type mine fuzes, and boobytrap devices normally are not used. Protective minefields are laid

across the most likely enemy avenues of approach, within small arms range of the defenders but beyond hand grenade range. Protective minefields must be removed by the installing unit or, in the event of relief by another unit, the responsibility must be formally transferred to the relieving unit. Battalion and comparable commanders are authorized to employ protective minefields unless specifically restricted by higher headquarters. This authority cannot be delegated lower than company and comparable commanders. The commander authorizing installation of a protective minefield must consider its effect on other security measures, on normal activities of his unit, and on probable future missions.

f. Defensive Minefield. A defensive minefield is one employed in accordance with a division's plans to defeat or limit penetrations into or between company, battalion, or brigade defense areas, to strengthen or link other obstacles, and to strengthen the defense areas. The location of defensive minefields should be coordinated with division and corps fire support plans. Division and higher commanders are authorized to employ defensive minefields unless specifically restricted by higher headquarters. This authority cannot be delegated lower than brigade and comparable commanders. All types of mines, boobytrap devices, and flares may be used, but their use should be carefully considered by weighing the advantages to be gained against possible future disadvantages.

g. Barrier Minefields. A barrier minefield is one employed to block enemy attack formations, especially to the flanks and rear; to deflect or canalize the enemy's approach into selected target or battle areas, and to limit or contain deep enemy penetrations or wide envelopments in order that supporting fires and maneuver forces can be concentrated and employed against the threats. Barrier minefields are major elements in the defensive operations of a corps or larger unit and their use is carefully coordinated with other tactical plans including future offensives, counterattacks, or retrograde actions. Their location is coordinated with corps fire support plans and either covered by defensive fires, or placed under surveillance so that fires or reserves can be shifted to cover them if the need arises. Barrier minefields are laid in considerable depth and offer maximum resistance to breaching. All types of mines, boobytrap devices, and flares are used. Corps and higher commanders are authorized to employ barrier minefields unless specifically restricted by higher headquarters. This authority cannot be delegated lower than division, and comparable commanders. Because of the resources required, the use of barrier minefields in the forward portion of the combat zone is lim-

ited. They are employed extensively in the rear portion of the combat zone as a part of a corps or field army defense plan.

h. Nuisance Minefields. Nuisance minefields are employed to delay and disorganize the enemy and hinder his use of an area or route. They must be laid with imagination to produce the desired effects and are particularly appropriate to retrograde movements and denial operations. Nuisance minefields are an effective means of mining in depth and are employed as a part of a deliberately planned barrier system in retrograde movements. They are employed along major roads, railroads, and avenues of approach, and in areas likely to be used by advancing enemy troops, such as potential artillery positions, bivouac areas, and observation and command post sites. The effectiveness of a demolished bridge, crater, abatis, or other obstacle is greatly enhanced if the site and the surrounding area are seeded with nuisance mines, both anti-tank and antipersonnel. Such mining hampers the reduction, rebuilding, or repairing of the obstacle. They may be employed in denial operations to deny facilities of military significance such as public buildings, warehouse areas, airfields, abandoned military supplies, and important railway installations. Nuisance minefields are more accurately described as "nuisance mining," since the concept of a limited area or field is not involved. Characteristics of nuisance minefields are: the use of special mines, fuzes, and boobytraps; no standard pattern; no minefield marking except as a temporary measure to protect friendly troops; and abbreviated minefield records. Because of the hazard presented to friendly troops and restrictions placed on the maneuver of friendly troops, the use of nuisance minefields is coordinated with the overall tactical plans of high headquarters, including plans for future offensives and counterattacks. A high percentage of the antitank mines used in a nuisance minefield should be boobytrapped, and, where possible, the antipersonnel mines used should be of the nondetectable type. Normally nuisance minefields should be well concealed for maximum effectiveness and be difficult to remove; however, if the threat of mines in itself delays the enemy, then the need for uniformly careful concealment is somewhat less. Nuisance minefields can seldom be covered by fire except by aircraft. Field army and higher commanders are authorized to employ nuisance minefields unless specifically restricted by higher headquarters. This authority cannot be delegated lower than division and comparable commanders.

i. Phony Minefields. Phony minefields simulating live minefields are normally used when time, effort, or materiel do not permit laying a live minefield; when gaps are required by the tactical plan within or between existing minefields; or to economize on

mines and installation effort. To be effective, a phony minefield must resemble an actual minefield and have the same appearance, fire coverage, and marking. Phony minefields may be employed by any commander who has authority to employ the type of live minefield simulated.

j. Boobytraps and "Dirty Trick" Devices. A boobytrap is an explosive charge or other device which explodes when an unsuspecting person disturbs an apparently harmless object or performs a presumably safe act. A "dirty trick" device is a manufactured boobytrap designed to imitate some useful article that appeals to an individual's desire for possession. Boobytraps and "dirty trick" devices create uncertainty and suspicion, cause confusion, inflict casualties, destroy materiel, and lower the morale of enemy forces. Boobytraps and "dirty trick" devices may be effectively used during retrograde operations in much the same manner as are nuisance mines. In the defense, boobytraps and "dirty trick" devices may be located forward of the FEBA on avenues of approach to impede enemy progress, delay neutralization of other obstacles, and give warning of enemy approach. Theater commanders prescribe policies for the employment of boobytraps and "dirty trick" devices and, unless specifically prohibited from doing so, field army commanders are authorized to employ them. This authority can not be delegated lower than division and comparable commanders. Boobytraps and "dirty trick" devices are reported and recorded as nuisance minefields (*l* below). For details of their employment see FM 5-31.

k. Mines Laid by Guerrillas, Raiding Parties, and Aircraft. Mines may be laid behind enemy positions by friendly guerrilla forces, raiding forces, or aircraft. Unless self-neutralizing, they constitute a threat to future operations; therefore, their use is coordinated with operation plans. Authority to lay mines in rear of enemy positions is the same as for nuisance mines. When employed they are reported and recorded as nuisance minefields.

l. Minefield Reports and Records. Mine warfare may be employed with minimum hindrance to tactical flexibility by enforcing the reporting and recording system. Reports on all minefields except protective are forwarded through channels to field army so that all commanders are kept informed of mine warfare actions which might affect their tactical plans. Reports on protective minefields are forwarded to division or comparable level. Written minefield records are prepared simultaneously with mine installation and, except for protective minefields, are forwarded to field army level. Records on protective minefields are forwarded to division or comparable level. The maintenance of minefield re-

ports and records and the dissemination of current information is the responsibility of each headquarters. Reports and records are retained until the mines and minefields are removed. All minefields, including nuisance minefields, are reported and recorded in accordance with FM 20-32.

m. Planning Factors. Planning factors for estimating time, labor, materials, equipment, and transportation required for the various minefields are contained in FM 20-32 and FM 101-10.

38. Barbed Wire Entanglements

a. General. Barbed wire entanglements may be either fixed or portable and are a simple, effective, and flexible antipersonnel obstacle. They may be used, in some instances, to impede the movement of vehicles.

b. Classification. Barbed wire entanglements are classified according to depth (belts, bands, and ozones) and according to use (tactical, protective, and supplementary). A belt is a single entanglement in depth; a band is two or more belts in depth without interval; and a zone is two or more bands or belts in depth with an interval between each. Tactical barbed wire entanglements are those sited along the friendly side of final protective lines for the purpose of breaking up enemy attack formations or for diverting him into areas covered by intensive weapons fire. They extend across the entire front of a battle area but are not necessarily continuous. Tactical wire is equivalent in effectiveness to 3 belts of 4- and 2-pace double apron fence. Protective wire entanglements are those sited to prevent surprise enemy assaults from close-in points and are located sufficiently close for day and night observation but far enough away to keep the enemy beyond hand grenade range. Protective wire entanglements are erected around rear area installations in the same manner and for the same purposes as protective wire in forward areas. Where possible, protective wire should be equivalent in effectiveness to one 4- and 2-pace double apron fence. Supplementary wire entanglements are those sited in such a manner as to conceal the exact traces of the tactical wire and the final protective line, as well as connect platoon and company battle areas.

c. Siting and Layout. To be effective, barbed wire entanglements are sited and laid out to meet the following requirements:

- (1) Under friendly observation, covered by fire, and where practicable, protected by antipersonnel mines, flame mines, trip flares, and warning devices.
- (2) Concealed from enemy observation as far as practicable by incorporating terrain features such as reverse slopes, hedges, woods, paths, and fence lines.

- (3) Erected in irregular and nongeometrical traces.
- (4) Employed in bands or zones wherever practicable.
- (5) Coordinated with other elements of the defense.

d. Lanes and Gaps. Lanes and gaps are provided for the passage of patrols, working parties, and attacking or counterattacking forces. When not in use they are kept closed by the use of portable obstacles covered by fire. In barbed wire zones, lanes and gaps are staggered on a zigzag pattern.

e. Design, Construction, and Employment. The details of design, construction, and employment of barbed wire entanglements are contained in FM 5-15 and FM 5-34.

f. Planning Factors. Planning factors for estimating time, labor, materials, and transportation required for barbed wire entanglements, are contained in FM 5-15, FM 5-34, and FM 101-10.

39. Demolition Obstacles

a. General. Demolition is the destruction of structures, facilities, or materiel by use of fire, water, mechanical means, weapons fire, aerial bombing, nuclear devices, or hand-placed explosives. A demolition obstacle is one that is created either by demolishing a structure which provides a passage over or through a natural obstacle, such as a bridge over a river or a causeway through a swamp; or by creating an obstruction where none previously existed, such as a road crater. Demolition obstacles are employed, in conjunction with other artificial obstacles, to strengthen or link natural obstacles into a barrier such as the blocking of roads and trails through wooded areas with abatis. Except for "hard" targets and targets of great size, demolition by hand-placed explosives generally is the most rapid, certain, effective, and economical means. Subsequent discussion of demolition obstacles in this paragraph is limited therefore, to those created by hand-placed explosives. For the details of employment see FM 5-25. For "hard" targets or targets of great size, such as tunnels, large masonry and concrete bridges, mountain defiles, airfields, port complexes, and similar installations, destruction by nuclear devices may be the most rapid, certain, effective, and economical. Demolitions using nuclear devices are discussed separately because of their special effects and because special authority and special handling are required.

b. Demolition Policy. Because of the military disadvantages and the adverse political, psychological, and economic consequences of overdestruction, field army and higher commanders promulgate demolition policies, issue instructions to insure that excessive destruction is not permitted. Excessive destruction may im-

pose a tremendous repair mission or create an adverse civilian reaction either of which could seriously hinder future operations and threaten successful accomplishment of the mission. A sound military reason must exist for all demolitions. Unless the enemy is adversely affected tactically or strategically by a specific demolition, it should not be considered.

c. Site Selection. The selection of demolition obstacle sites or targets is of great importance. Where possible, the sites selected are so located that bypassing the resulting obstacle is more difficult and time-consuming than removing, rebuilding, or repairing the destroyed facility. Road craters, for example, are sited where the terrain to either side of the road is untrafficable and detouring so time consuming as to be infeasible.

d. Execution. Normally, tactical demolitions are prepared and destroyed on order of corps and lower commanders. Strategic demolitions normally are prepared and destroyed by field army and higher commanders. When a demolition has both strategic and tactical significance, preparation and destruction may be delegated to the tactical commander responsible for the area concerned or at the least coordinated with him. Some demolitions, however, may be so vital to the plans of higher commands or the structure itself so important that the commander, at whatever level of command, will reserve the destruction to his own order. An example is a major highway bridge over a large river obstacle. Such demolitions are called *reserved demolitions* and can include those planned for destruction as part of preliminary operations as well as those to be destroyed at the last moment in the face of the enemy. Demolitions are accomplished by a *demolition firing party*, usually engineers. The demolition firing party is given specific instructions as to who may AUTHORIZE the destruction, advance or delay destruction, when destruction will be accomplished, action to be taken if threatened with capture, whether the commander of the demolition guard may execute the demolition on his own authority, what unit or units require the use of the facility before demolition, and other pertinent information. These instructions are transmitted to the demolition firing party by a form entitled "Orders to the Commander, Demolition Firing Party." (See FM 5-25.) If there is danger that the demolition site may be captured by the enemy, a *demolition guard* is provided by the commander authorized to order destruction. Normally, the commander of the demolition guard commands both the demolition guard and the demolition firing party. Instructions to the demolition guard are transmitted by a form entitled "Orders to the Commander of the Demolition Guard." (See FM 5-25.) For reserved demolitions, the commander controlling destruction may

station a liaison officer with adequate communications at the site. Under such circumstances the liaison officer receives the demolition execution order from the commander and transmits it to the demolition guard and demolition firing party. This assists in insuring that destruction is accomplished at the proper time.

e. Methods. Deliberate demolition is used when enemy interference during preparation is unlikely and sufficient time is available for thorough reconnaissance and careful preparatory work. This permits economy of means and certainty of execution. Hasty demolition is employed when time is limited and both economy and controlled effect are secondary to speed. In either method, structures are destroyed at their most vulnerable points so that a minimum of effort and material is expended. The details of demolition techniques are contained in FM 5-25.

f. Bridge Demolitions. The demolition of bridges constitutes one of the primary artificial obstacles incorporated into barrier systems. The complete destruction of a bridge frequently is neither necessary nor justified. The factors which govern the extent of destruction are the length of delay required, the damage necessary to require construction of a new bridge rather than repair the old one, and the enemy's expedient bridging capability. The strategic or tactical impact of bridge demolitions depends on the width of the water barrier involved and its location in the area of operations. Bridge demolitions are coordinated so that all bridges over any particular stream in a given sector are destroyed thus eliminating all alternate crossings. All existing or possible fording sites which permit the enemy to bypass the demolished bridges should be cratered or mined.

g. Ferries and Ferry Sites. To complete the obstacle effect of a river, in addition to bridge demolitions and the mining or cratering of fords, it is necessary to destroy or seriously damage all ferry facilities including ferryboats, mechanical devices at the ferry slips, docking facilities, and the approaches to the river.

h. Dams and Locks. Dams and locks, particularly the larger ones, are generally considered to be strategic targets; however, they also have a tactical significance since they often provide a means of crossing an otherwise unfordable river. Unless otherwise specified for strategic reasons, demolition of locks and dams ordinarily is limited to the destruction of watergates, sluices, controls, and any crossings over the stream in conjunction with these structures.

i. Craters. Craters are effective obstacles on roads, trails, causeways, or paths, provided they are constructed too wide to be spanned by tracked vehicles, too deep for wheeled vehicles to drive

through them, and provided the terrain is of such a nature that the crater cannot be easily bypassed. Defiles, steep sidehill cuts, and high embankments are good sites for craters. Explosives may be placed in culverts or in holes dug in the road and, if desired, detonated when an enemy attack is about to overrun the obstacle.

j. Abatis. Where a road, trail, or firebreak passes through heavily wooded areas, abatis make effective obstacles to vehicular movement. They are considered to be demolition obstacles only in the sense that the trees required may be felled by explosives as well as by the use of handtools.

k. Tunnels. Demolition of tunnels using conventional explosives is virtually impossible unless time consuming and expensive preparations are made. They are particularly suitable targets for atomic demolition munitions.

l. Masonry Buildings. The demolition of masonry buildings in cities with narrow streets and closely built-up areas creates rubble which blocks the streets. Cities of this type are incorporated into barrier plans, particularly when communications routes converge on them, thus making it necessary for the enemy to capture rather than bypass them.

m. Planning Factors. Planning factors for estimating the number of demolition obstacles by type as well as a general estimate of the time, labor, materials, and transportation required are contained in FM 101-10.

40. Artificial Flooding

a. General. The conventional and most frequent concept of the use of water as part of a barrier system generally is in terms of rivers, lakes, drainage and navigation canals, and poorly drained areas. These are either natural or manmade and are fixed features of the landscape. Where the possibility exists to alter normal hydrologic characteristics, the obstacle value of a river can be greatly enhanced (fig. 5).

b. Tactical Use of Dam Reservoirs. In a tactical situation there are three major effects which may be achieved by the use of dam reservoirs. These are—

- (1) *Destruction.* A flood wave resulting from a large volume of impounded water released almost instantaneously may have sufficient force to destroy permanent and temporary bridges, houses, and factories. From a tactical viewpoint, the released water can disrupt the assault, ferrying, and bridging phases of an enemy river crossing operation.

- (2) *Overbank Flooding.* If the banks of a river are low and a large quantity of impounded water is released, overbank flooding usually occurs. From a tactical viewpoint, overbank flooding increases the width of the water barrier, washes out or makes installed tactical bridging unsafe to use, or washes out or floods crossing site approach roads for a considerable period of time. Also, normally the saturation of the banks temporarily reduces soil trafficability.
- (3) *Threat of Release.* Control of a dam reservoir and the inherent threat of suddenly releasing the impounded water into a stream can influence the actions of the enemy. In such a situation, the attacker probably would delay crossing of the river in force until control of the dam is gained to give some assurance of success in the crossing operation and to prevent the possibility of isolating the assaulting units from the main body and exposing them to defeat in detail.

c. *Other Flooding Methods.* In addition to releasing impounded waters, artificial flooding may be created by other methods. Expedient dams may be used to obstruct a river or stream and create still-water barriers where none previously existed either by forming a lake or flooding low lying areas with relatively poor natural drainage. In some instances, flooding can be created by breaching

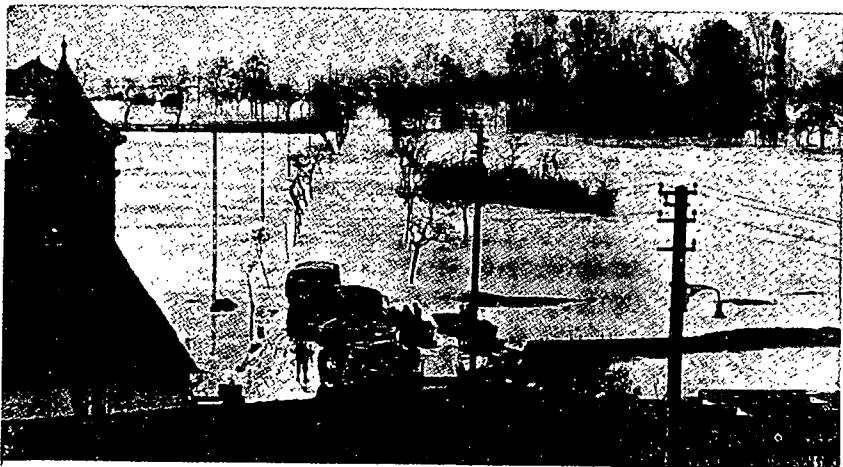


Figure 5. Artificial flooding is an excellent means of delay. Cross-country mobility is denied and the enemy confined to hard surfaced roads for movement.

levees and dikes which keep the water from spreading over adjacent terrain. In locales where artificial means are employed to drain the area, muddy, marshy, or swampy conditions often can be recreated by destroying the pumping and drainage facilities. Aqueducts and siphons associated with navigation or drainage canals often can be destroyed and flooding of tactical significance created in adjacent areas.

41. Other Obstacles

a. General. In addition to the obstacles, previously discussed, there are numerous others which can be used to improve those natural obstacles that are not wholly effective in themselves. This not only reduces the time, labor, materials, transportation, and equipment required but makes camouflaging and concealing the obstacles easier. The details of construction and employment of other artificial obstacles are contained in FM 5-15.

b. Log Obstacles. In heavily forested areas, many effective log obstacles, other than abatis, can be constructed at defiles from available materials. The obstacles include cribs and hurdles, log posts, and cables tied between trees.

c. Antitank Ditches. In open country, devoid of suitable natural obstacles, antitank ditches may be employed; however, they require considerable time and effort. They generally are better suited for use in defensive areas in the rear portion of the combat zone than they are in the forward portion of the combat zone.

d. Steel Obstacles. Steel beams, ramps, tetrahedra, and hedgehogs are generally built into permanent defensive works. They require considerable resources and generally are beyond the capabilities of tactical units to fabricate. For details see TM 5-310.

e. Concrete Obstacles. Concrete obstacles usually are found in permanent defense installations. They require considerable resources and are generally beyond the capabilities of tactical units to construct. For details see TM 5-310.

f. Obstacles to Airborne and Air Landed Troops. Artificial obstacles which can be placed on suitable landing areas and drop zone, include craters, posts, barbed wire, immobilized or parked vehicles, rock-filled oil drums, minefields, felled trees, and contaminants. For details see FM 5-15.

g. Beach and River Line Obstacles. Emplacing obstacles such as mined posts, piles, steel and concrete obstacles, rock cribs, barbed wire, and mines under water and along the beaches and river banks will hinder enemy landings. Enemy troops are forced to land short of the beach or river bank and cross a wide

obstacle-studded area. This gains time for the defender because it delays attacking forces in vulnerable landing areas and on the water, permits maximum effective use of defensive weapons, canalizes movement of landing craft and personnel into areas of heavy defensive fires, disrupts landing procedures, and causes confusion among landing units. In many cases the obstacles can be improvised from local materials. For details see FM 5-15.

42. Atomic Demolition Munitions (ADM)

a. General. Since the purpose of using atomic demolition munitions is to cause a certain degree of damage to specific targets, ADM may be regarded simply as a bigger and better explosive; however, nuclear material is involved. The contingencies of the accompanying nuclear effects require, therefore, that ADM also be viewed in the same light as nuclear weapons. The discussion in this paragraph is limited primarily to employment of ADM; however, the role of other nuclear weapons delivery means, in relation to barriers, is discussed briefly.

b. Employment. Normally instructions governing the employment of ADM are published separately by the theater commander. Based on these, subordinate commands also generally publish separate instructions. With the ADM it is possible to destroy targets which previously were beyond any reasonable capability to destroy by conventional explosives. Selection of ADM targets involves the consideration of several factors. Some targets, such as bridges and locks, usually can be quickly and adequately destroyed by conventional explosives; some, such as dams, may be suitable for demolition by either conventional explosives or nuclear weapons; others require either excessive amounts of conventional explosives and emplacement time, such as tunnels and underground installations; or require rapid and positive destruction, such as airfields. Targets requiring either an excessive amount of labor or an unacceptably long time for emplacement of conventional explosives, due to type of construction or size, are considered to be "hard" targets and are particularly suited for the use of ADM. The "military worth" of a target must be evaluated. It depends upon the reduction in the enemy's combat effectiveness if the use of the target is denied to him. If the reduction in combat effectiveness is such that a major advantage is gained, the target has a high "military worth." Targets located in or near large urban areas in friendly territory normally should not be attacked with nuclear weapons; however, the advantages of destroying the target, particularly a "hard" target, must be weighed against the possible effects on the local population. For details of employment of ADM see FM 5-26.

c. ADM Targets.

- (1) *Defiles.* Defiles are frequent ADM targets because they have high "military worth", are "hard", lend themselves to effective blocking, and are seldom located near areas of dense population.
- (2) *Tunnels.* Tunnels are frequent ADM targets because they have high "military worth", are seldom located in densely populated areas, and are "hard".
- (3) *Bridges.* Bridges are infrequent ADM targets since, with the possible exception of some heavy masonry and concrete structures, they can be destroyed adequately by conventional explosives. Complete destruction is seldom required.
- (4) *Stream cratering.* The use of ADM for stream cratering is infrequent; however, the great cratering capability of ADM makes possible the diversion of streams to create obstacles where the enemy least expects them. The crater lip can form a temporary dam, create a lake, cause over-bank flooding, and produce an effective water barrier.
- (5) *Dams and dikes.* Dams and dikes are infrequent ADM targets since a reasonable amount of conventional explosives normally can accomplish the desired degree of destruction.
- (6) *Area contamination.* It is possible to employ ADM to create radiologically contaminated areas as a part of a barrier system; however, the requirements for optimum meteorological conditions and the temporary nature of the contamination makes the use of ADM for this purpose infrequent. Unless contamination is renewed, the obstacle created is effective only for a few days.

d. Planning Factors. Planning factors for employing ADM are contained in FM 5-26 and FM 101-31.

43. Artillery and Aircraft Nuclear Delivery Systems

When a demolition target is inaccessible to friendly troops, it may be destroyed by artillery or aircraft nuclear delivery systems. These systems provide a varied choice of yields and burst options. Surface and subsurface burst options can cause cratering, tree blowdown, and rubble in cities and towns, as well as a blanket of radioactive contamination. Airburst options can be employed if fallout is not desired. Actual selection of the most suitable delivery system for attack of specific targets is based on a target analysis which considers the many variable factors involved. As a general rule, however, creating an obstacle using artillery or

aircraft delivery systems is much more expensive in terms of system cost than creating the same obstacle by atomic demolition means. For the employment of artillery and aircraft delivered nuclear weapons see FM 101-31.

44. Contaminants

a. General. Any barrier is made even more effective when chemical, biological, or radiological (CBR) contaminants are used since the enemy is forced to mask, wear protective clothing, or decontaminate the barrier. The tactics and techniques of employing CBR contaminants are contained in FM 3-5.

b. Authority.

(1) *Toxic agents.* The initial authority to employ toxic chemical, biological, and radiological contaminants must first be received by the theater commander. After receipt, the theater commander may further delegate this authority to his subordinate commanders, subject to any policy restrictions deemed necessary. After receipt of initial authority, field army commanders are authorized to employ toxic chemical mines in barrier and nuisance minefields. This authority cannot be delegated lower than division and comparable commanders. The employment of toxic chemical mines normally is not authorized in protective or defensive minefields, unless they are later integrated into a barrier system. After authority to use toxic CBR agents is received, operations involving toxic chemical contaminants normally are planned and executed by divisions and higher units while operations involving toxic biological and radiological contaminants normally are planned and executed by corps and higher units.

(2) *Nontoxic chemical agents.* Normally, there are no restrictions on the use of nontoxic chemical agents such as flame and smoke. Planning and conducting flame and smoke operations are performed at all levels of command. Operations involving the large scale use of nontoxic agents normally are coordinated with adjacent and higher headquarters before the fact.

c. Chemical Agents. Toxic chemical mines, belts of toxic chemical agents, and flame mines are used to kill or disable personnel and to restrict the use of terrain and material. Toxic chemicals may be used with other obstacles or as chemical barriers to protect the front or flanks, isolate the battle area, delay the enemy during retrograde operations, strengthen the defense, impede

enemy counterattack, or isolate a bridgehead. A chemical barrier is an area contaminated by toxic chemicals or a minefield composed of toxic chemical mines. A chemical barrier is not absolute in itself and must be covered by supporting weapons fire or observation just as any other obstacle. This also forces the enemy into closer contact with the contamination. Toxic chemical agents are a hazard to friendly troops as well as to the enemy for the duration of their effects. This is considered when coordinating the use of toxic chemical agents with the barrier plan and other operation and logistic plans. Nontoxic chemical agents, primarily in the form of flame mines, are used for the same purposes as are toxic chemical mines, as well as for battlefield illumination and for warning of an enemy approach at night. When using flame mines, the possible effect on other obstacle components, such as trip wires, electric detonating wire, and the chemical agents in chemical mines, is considered.

d. Biological Agents. Due to their nature, methods of dispersing the agents, and the time required for incubation, biological agents are seldom employed directly in barriers and obstacles. They may be used, however, on personnel targets which barriers and obstacles assist in forming, particularly in retrograde operations.

..Radioactive Contaminants. Radioactive contamination can result from the dissemination of radiological agents or from radioactive fallout or neutron induced radioactivity caused by the detonation of a nuclear weapon. The use of radiological contamination to produce casualties or deny use of an area may be militarily feasible; however, it is seldom practical to employ a nuclear weapon solely to deny the enemy use of an area by deliberately producing induced radioactivity. Outside of the initial effects area, radioactive fallout caused by the surface detonation of a nuclear weapon creates a residual effect which may cover many square miles. Contamination with radiological agents may be used in barriers in the same manner as are toxic chemical agents.

CHAPTER 4

OPERATIONS—BARRIERS

45. General

The basic principle underlying the use of barriers in tactical operations is that of augmenting the combat effectiveness of available forces to the maximum extent. Barriers are one of the more important tools of combat support available to the commander to assist him in controlling the enemy. The commander who skillfully knits natural and artificial obstacles into barriers changes the military characteristics of the terrain to fit his tactical plans. He increases his chances for gaining relative superiority in mobility and achieves security and economy of force, thus permitting him to mass more effectively for offensive action. The effective use of barriers permits greater dispersion and reduces vulnerability to mass destruction weapons. Well designed barriers compel the enemy either to concentrate and present a lucrative target or to seek bypasses around the barriers. An additional benefit gained from the proper use of barriers is influence on enemy morale. This psychological benefit, not easily measured, assists in reducing the effectiveness of enemy forces. The employment of barriers is not restricted to any one type of tactical operation. Although barriers are defensive by nature and their use has its greatest application in defensive and retrograde operations, they can be gainfully employed in the offensive. Through the theater commander, friendly guerrilla forces deep inside enemy held territory may be enlisted to augment the employment of barriers in all types of operations. The use of barriers is subject to restrictions of higher headquarters.

46. Use of Barriers in the Offense

a. General. In the offense, barriers are employed to assist in flank and rear area security, to impede enemy counterattack, to strengthen weakly held sectors, and to assist in entrapping withdrawing enemy forces.

b. Flank and Rear Area Security. Barriers provide an effective means of increasing the flank and rear area security of the attacking force. In addition to any natural obstacles which may exist, artificial obstacles are placed on the flanks to provide additional warning of and protection from enemy flanking action prior to

ing force does not intend to enter immediately. It should be noted, however, in using nuclear surface and subsurface bursts, that an intelligent, aggressive enemy is not delayed significantly except by the crater and the contaminated area immediately surrounding it. The contamination decays relatively fast; therefore, the areas of militarily significant contamination shrink rapidly. Barrier plans provide for strengthening the weak flank and rear barrier lines should a strong enemy threat develop in those areas.

c. Impediment to Enemy Counterattack. Barriers assist in impeding counterattacks during the reorganization phase following seizure of an objective. Initial attack plans should include a barrier plan which outlines the use of natural and artificial obstacles to protect the advance of the command and to impede the movement of any known or suspected enemy counterattacking forces. Detailed coordination of this barrier plan with the plans for defending and protecting each successive objective is accomplished before the start of the attack so that the attacking force can reorganize after seizing the objective with relative freedom from dangerous enemy counterattacks. During the attack and the reorganization of the objective, planned barriers are positioned as required with priority to the positioning of the barriers on likely enemy avenues of approach. Because of the close proximity of the enemy and the probable speed of his reaction, they consist of obstacles which can be positioned quickly such as protective minefields, hasty road blocks, and prepared demolitions (fig. 7). Barriers are important in those offensive operations where the attacking force lacks maneuver room and is faced with a numerically superior enemy, such as the initial phases of river crossing, airborne, or amphibious operations.

d. Strengthen Weakly Held Sectors. The effective use of barriers often permits a commander to withdraw forces from the sector of his supporting attack and concentrate them for his main attack. Barriers can replace fire support and units that are withdrawn, thus filling the gaps between the units remaining in the sectors (fig. 8).

e. Entrapment of Enemy Forces. Barriers are employed to fix the enemy in position and to block or canalize his withdrawal. Barriers are placed in the enemy's rear and may consist of mines or contaminants laid by aircraft; demolitions and other obstacles constructed by airmobile forces, airlifted demolition teams, or friendly guerrilla forces, and artillery and tactical air interdiction, including deliberate surface and subsurface nuclear bursts. The use of barriers for entrapment are coordinated with artillery, tactical air, and friendly guerrilla operations, as well as planned future operations. This will prevent duplication of effort and in-

sure denying all avenues of escape to the enemy without impeding our offensive maneuver (fig. 9).

a. General. Barriers are especially well suited for employment in the defense since they contribute materially to the accomplishment of both principal purposes of defensive combat: to gain time and to economize on forces. One of the fundamentals of defensive combat is, therefore, a coordinated barrier system. Barriers are employed to—

Figure 8. Barriers employed to strengthen weakly held sectors.

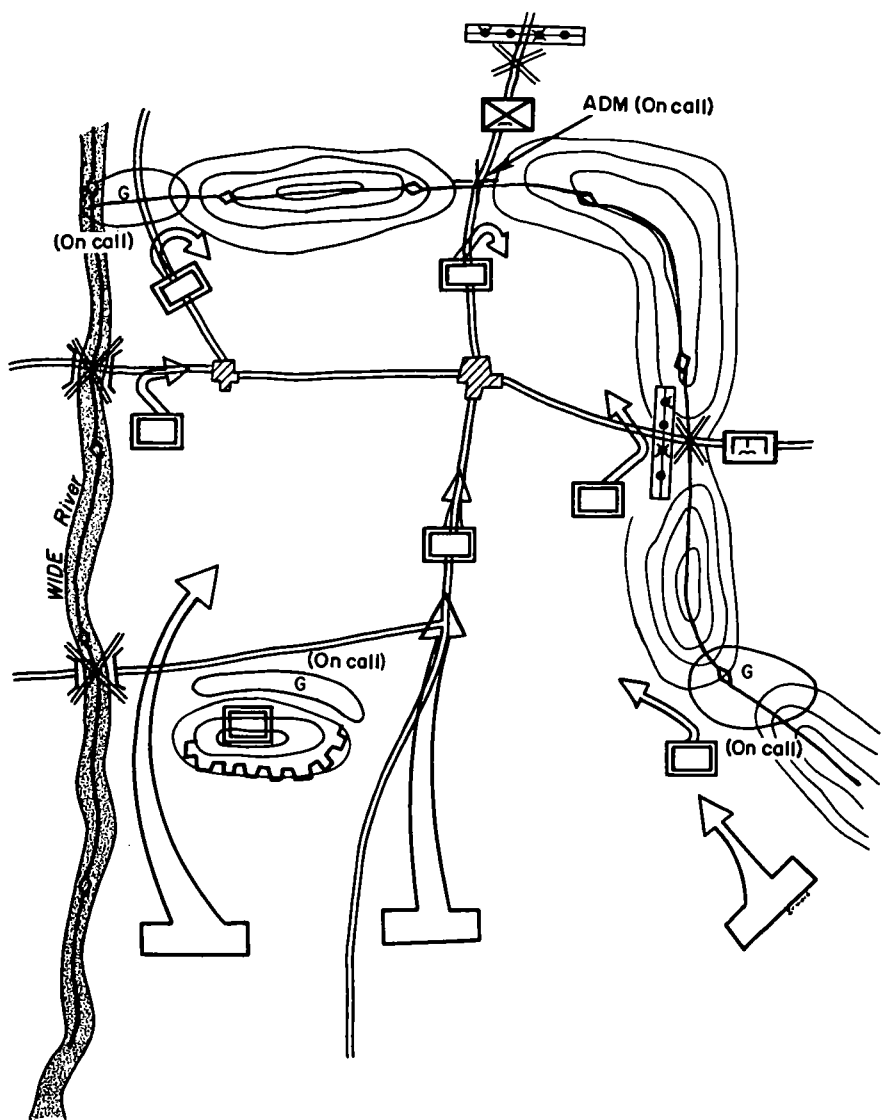


Figure 9. Employment of barriers in entrapment of enemy forces.

- (1) Delay and disrupt enemy advance toward the front or flanks, thereby increasing his vulnerability to defensive fires (fig. 10).
- (2) Delay, limit, or canalize movement of penetrating or enveloping enemy forces, thus providing time to bring defensive fires to bear on the threat and/or organize and launch counteroffensive action (fig. 11).
- (3) Permit economy of force.
- (4) Assist in flank and rear area security.

b. Elements of a Defense Barrier System. The principal elements of a defense barrier system are covering barriers (when

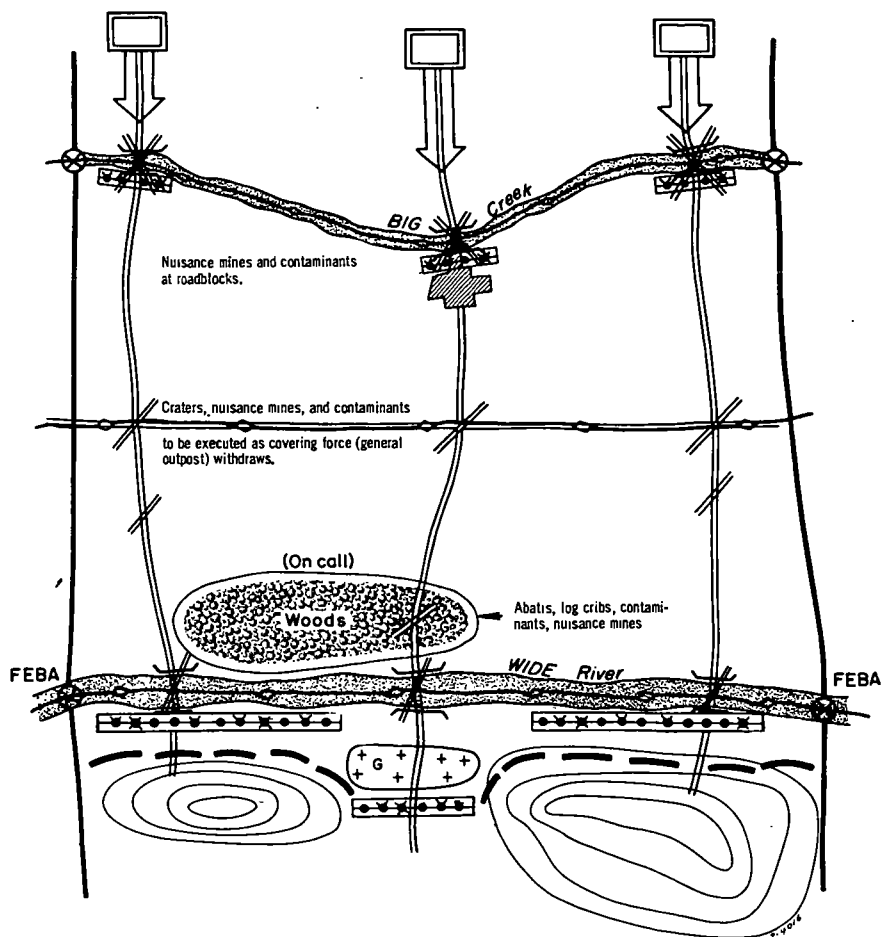


Figure 10. Barriers employed to delay enemy advance toward front.

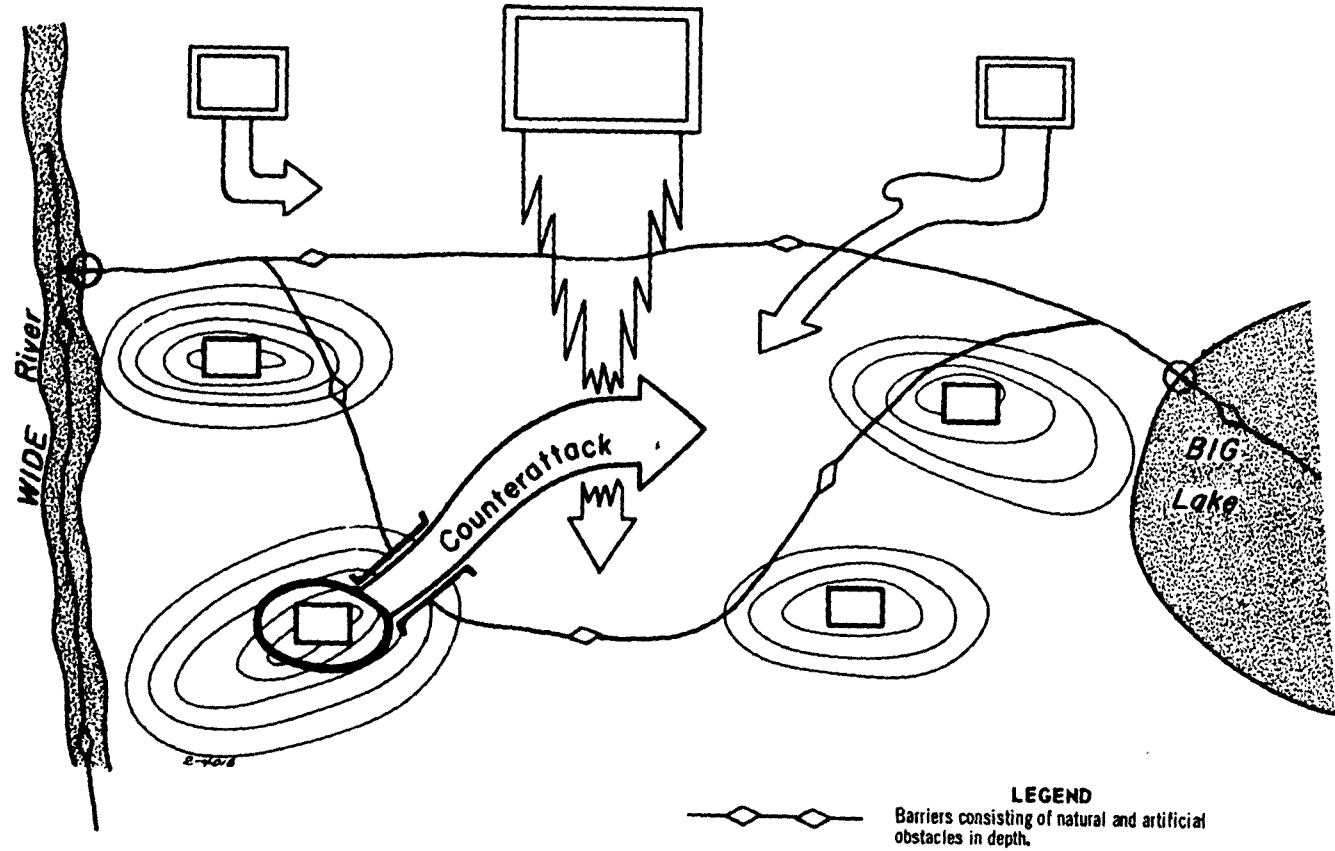


Figure 11. Barriers employed to limit or canalize enemy attack.

enemy situation permits) forward barriers, intermediate obstacles and barriers, flank barriers, and rear barriers.

(1) *Covering barriers.* A covering barrier is located forward of the battle area. It is selected by a field army, corps, or division to assist the delaying actions of covering forces, rear guards, and security forces. It consists of lines of screening obstacles designed to slow the initial enemy thrust, separate tanks from infantry, and deceive the enemy as to the location of the main battle area. Covering barriers are used when not in actual contact with the enemy or when withdrawing to a defense area to the rear. Covering barriers are not necessarily continuous but may consist of a series of coordinated obstacles in depth across the enemy's major avenues of approach. Because of the limited time available to construct covering barriers as well as the limited size of the security forces, emphasis is placed on the use of natural obstacles reinforced with those artificial obstacles which can be constructed quickly and easily, such as demolitions (conventional and ADM), nuisance mines (when their use is authorized), hasty road blocks of all types, and abatis. Covering barriers may be employed along international borders to provide early warning of and inflict delay upon an invading enemy when the probable enemy has the capability of suddenly striking without warning or declaration of war.

(2) *Forward barriers.* A forward barrier is located generally along the forward division's initial and successive defense areas. It consists of the defense areas and strong points in depth, coordinated fires of all weapons, and artificial and natural obstacles employed in depth for close in protection and defense. It is not necessarily a continuous field of antitank and antipersonnel mines but combines all types of obstacles, both natural and artificial, and all weapons fires. It is sited on the strongest terrain features available and is the backbone of the defense. Depth to the forward barrier can be achieved by using a series of screening obstacles on the dangerous avenues of approach and covered by the forces along the GOP, the FEBA proper, intermediate obstacles in depth placed on major avenues through the division's defense area, including rear defense areas and blocking positions. In establishing a forward barrier, the terrain is analyzed to determine those areas which stop tanks or permit their passage only with great difficulty (ch. 3). Although each

defense area is founded on the strongest combination of terrain features available, all areas may not be equally strong. When portions of the forward barrier are located on vulnerable terrain, the natural vulnerability of the terrain is reduced by using all types of artificial obstacles and coordinated defensive fires.

- (3) *Intermediate barriers.* An intermediate barrier is one that is located between the forward and rear barriers, or between less than division sized units. They are developed initially by constructing short minefields, abatis, road craters, bridge demolitions, and other obstacles at random between the forward and rear barriers, as time, labor, materials, and transportation become available. These individual obstacles are sited where natural obstacles, such as forests, unfordable streams, swamps, and escarpments, prevent easy bypassing. They are in time, connected into intermediate barriers to form a rough cellular pattern. Thus the enemy is always presented with a barrier to surmount regardless of the direction in which he moves. Intermediate barriers permit limited penetration of the forward barrier without jeopardizing the entire battle area and assist in canalizing enemy forces into preselected target areas.
- (4) *Rear barriers.* A rear barrier is selected by a corps, field army, or higher command around which to organize a rear battle area and to prevent, or slow, deep enemy penetrations or wide envelopments. The principles for locating and constructing rear barriers are the same as for forward barriers. Artificial obstacles are used more extensively since time, materials, transportation, equipment, and specially trained personnel are normally not as limited.
- (5) *Flank barriers.* A flank barrier is located to protect the flank of a division or larger unit to prevent or slow enemy penetrations and envelopments. The principles of locating and constructing intermediate obstacles and barriers are applicable to flank barriers. In the rear portion of the combat zone, flank barriers tend to resemble rear barriers insofar as the types and uses of artificial obstacles are concerned. In the forward portions of the combat zone they tend to resemble forward barriers.

c. *Development of a Defense Barrier System.*

- (1) The general planning of a barrier system and development of a barrier plan were discussed in chapter 2. In

a defensive situation, the pattern for progressive construction of a barrier system is as follows:

- (a) Artificial obstacles are located and tied into natural terrain barriers so that they block in depth the most important avenues of approach into and through the defense area.
 - (b) Other artificial obstacles, also tied to natural terrain barriers, are sited in depth across important avenues leading into flanks of the defense area.
 - (c) Artificial obstacles are extended laterally along the natural terrain barriers by blocking, on either side of existing natural obstacles, all routes which offer ready bypasses. In this manner the obstacles are coordinated and barrier lines formed.
 - (d) The lateral extension of barriers across the front and flanks of the defense area is completed by blocking remaining avenues of approach and by extending minefields across tank-favorable terrain. This closes all openings in the barriers through which tanks can pass and serves to separate enemy armor and infantry.
 - (e) At each stage of development, barriers are coordinated with all defensive fire plans for flat trajectory weapons, mortars, artillery, and tactical aircraft. Arrangements are made to either cover the barriers with fire or keep them under constant surveillance.
 - (f) At each stage of development, the barrier plans are coordinated with both counterattack plans and future plans for reassuming the offensive to insure that—
 - 1. An adequate number of gaps and lanes are provided in each barrier so that interference with the freedom of movement of friendly forces is minimized.
 - 2. Construction parties and, where necessary, security guards are designated and available to close gaps and lanes in the barriers when required by the tactical situation.
 - 3. Appropriate quantities and types of materials are available and stockpiled at or near gaps and lanes through the barriers so that they may be closed as required.
- (2) Construction of obstacles and barriers commences without delay at all echelons, without waiting for completion of the barrier plan, subject to instructions, restrictions, or limitations imposed by higher authority. Obstacles and barriers are continually improved as long as a unit

remains in a defense area. Where more than one task has the same priority, equal effort, within the means available, is given to each task. Any completion times specified for barriers or obstacles indicate only the minimum required construction and do not preclude further improvement as resources permit.

48. Employment of Barriers in a Retrograde Operation

a. General. In retrograde operations barriers are employed to assist planned withdrawals to successive delay positions or to rear battle areas. They are constructed by the delaying forces in contact with the enemy and are used to impede the enemy advance, economize on forces, and gain time. The effectiveness of barriers in delaying the enemy may be increased by tactical air hampering enemy pursuit, interdicting routes, and denying enemy logistical support. Barriers are not necessarily continuous but may consist of a series of coordinated obstacles located in depth of likely avenues of enemy approach. They extend across the front of the delay position as well as cover the flanks and rear of the position. The protection of flanks and rear is of particular importance when the enemy has freedom of maneuver and greater mobility than the delaying forces. Barriers tend to force wide enemy movements as he seeks to bypass the position as well as to canalize and stop his attempts to penetrate the position. Barriers assist in giving early warning to the delaying force commander thus giving him time to move reserves and fires to the threatened spot. They also assist in deception by giving the enemy the impression that the delay position is held in strength (fig. 12).

b. Preplanning of Barriers. When possible barriers are preplanned in retrograde operations. Friendly withdrawal routes and major routes of enemy advance are predicted. The terrain is thoroughly analyzed, to include both natural and manmade features; gaps in natural obstacles are determined; the best types of artificial obstacles are selected; the blocking of probable routes of enemy advance is insured; and the necessary resources are secured.

c. Types of Barriers Employed. The types of barriers employed are essentially the same as those employed in the defense. Covering and flank barriers are used forward of the defense area and generally cover a larger area than in the defense. For employment in the defense see paragraph 47.

d. Obstacles. The length of time a delay position is to be occupied and the labor and material available influence the type of obstacles used and the amount of construction undertaken. Obstacles most commonly employed are nuisance mines, short minefields, abatis, hasty road craters, bridge demolitions, masonry building

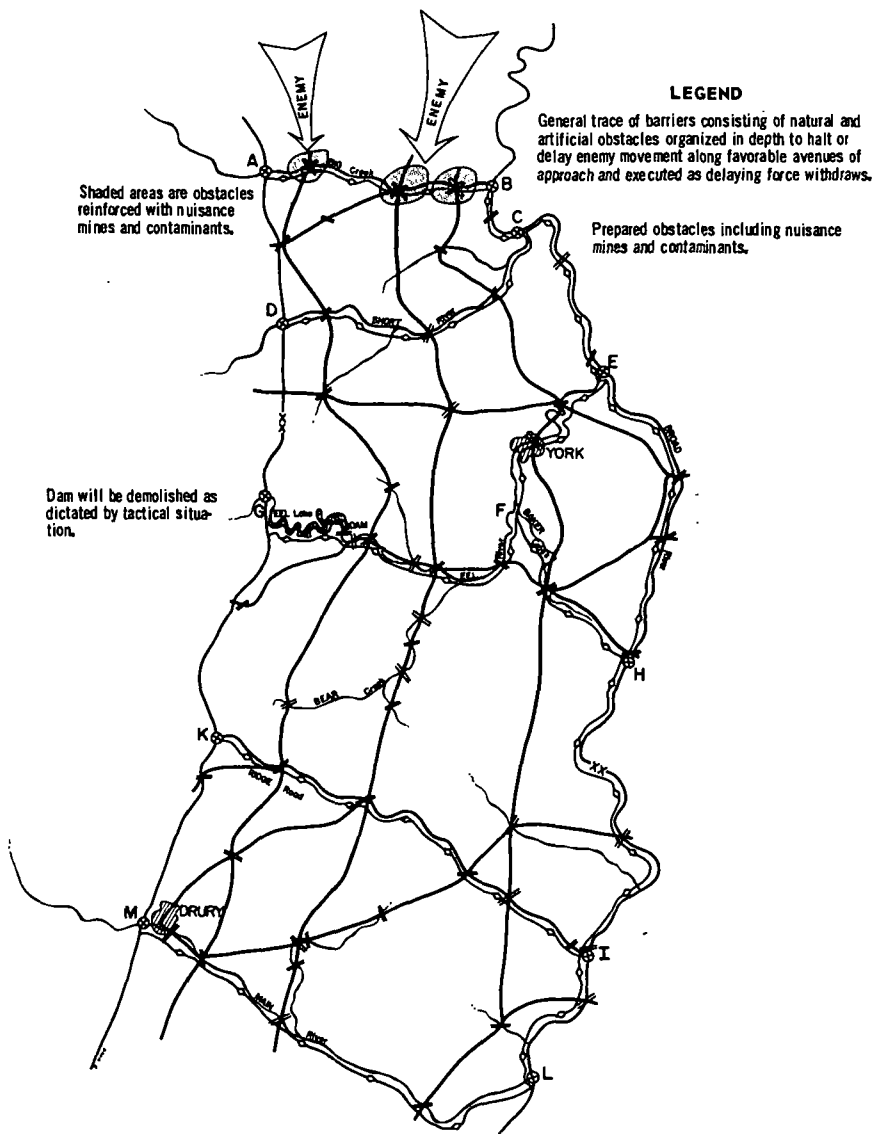


Figure 12. Barriers employed in a retrograde operation.

demolitions in towns, and contaminated areas. The employment of nuisance mines in locations suitable for enemy artillery gun positions, assembly areas, command posts, and communications centers, as well as along routes of advance, assist in delaying the enemy advance. It may not be necessary to mine all suitable areas and routes since the experience of the enemy in suffering casualties from nuisance mines tends to discourage his forward displacement until all areas or routes have been checked or cleared. In retrograde actions both demolition and mine warfare policy is carefully considered in relation to the purpose of the operation and the future plans of the command as a whole. Widespread demolition and nuisance mining may become a greater handicap to our forces during a future counteroffensive through the same area than a hindrance to the enemy during our retrograde movement.

49. Special Operations

a. *General.* The general principles of employment of barriers in offensive, defensive, and retrograde operations are applicable to special operations.

b. *Combat in Fortified Areas.*

(1) *Offensive.* In the attack of a fortified area obstacles consisting of mines, toxic chemicals, flame mines, or demolitions are employed to isolate the area; protect the flanks; and impede enemy relief, reinforcement, or counterattack, particularly during the reorganization phase when the attacking force is the most vulnerable.

(2) *Defensive.* A deliberately planned fortified area makes the widest possible use of barriers constructed in a manner to force the attacker to breach them before reaching his objective. Antitank, antipersonnel, and toxic chemical minefields; barbed wire entanglements; antitank ditches; and log, post, and concrete antitank obstacles are organized in depth in the barrier system to force the attacker to dissipate his strength against them.

c. *Combat in Cities.*

(1) *Offensive.* Barriers which can be rapidly constructed are employed outside a city to assist in isolating the area, protect against counterattack, and to impede enemy efforts to reinforce or withdraw. Mines, demolitions, and contaminants are the types of obstacles which can be most rapidly constructed and afford some degree of protection.

(2) *Defensive.* A city may be an obstacle in itself since it canalizes and impedes the attack. Likely avenues of approach are blocked by obstacles and covered with fire.

Antitank, antipersonnel, toxic chemical, and flame mines reinforced with wire entanglements hold the attacker under fire while he attempts to breach them. Tank obstacles are improvised throughout the city by blowing craters, demolishing walls, derailing or overturning street or railroad cars, and by making maximum use of rubble and debris from demolished buildings. Mining and boobytrapping of the obstacles, particularly those of rubble and debris are highly effective deterrents to breaching operations.

d. Operations at River Lines.

- (1) *Offensive.* In a river-crossing operation the attacker is vulnerable to counterattack during the successive periods of reorganization. To reduce this vulnerability barriers consisting of simple, quickly erected, artificial obstacles, such as contaminants, minefields, and demolitions are used to supplement or reinforce natural obstacles and to block avenues of approach into the bridgehead. These obstacles are covered with fire by the assault troops on the far bank, supplemented initially with fires from supporting weapons on the near bank.
- (2) *Defensive.* A wide, unfordable river is a formidable barrier but its natural characteristics can and should be strengthened or improved as time permits. River bank obstacles are improved through the use of minefields and contaminants. Likely bridge and assault crossing sites as well as areas suitable for airborne or airmobile landings are rendered unusable. Avenues of approach to the river line and possible assembly areas are contaminated, mined, or both. On the near bank, barriers and obstacles are constructed to aid in the isolation and destruction of any enemy elements which successfully cross the river.

e. Combat in Woods.

- (1) *Offensive.* Woods constitute an obstacle to mobility since vehicular movement generally is canalized along roads and trails. Obstacles are employed for the same purposes as they are in the attack of a fortified position.
- (2) *Defensive.* Barriers strengthen the obstacle value of woods and are placed both outside and inside the woods to delay the advance of the enemy so that better use of supporting fires can be made. Mines, abatis, cribs, posts, hurdles, and road craters are used to block roads, trails, and fire-breaks and prevent the movement of vehicles.

In woods, boobytrapped mines and barbed wire entanglements are effective in slowing up the attack particularly when antipersonnel mines are also employed. Chemical contaminants are also effective in wooded areas.

f. Jungle Operations.

(1) *Offensive.* Usually, jungles are formidable barriers within themselves. During offensive operations the attacker is vulnerable to counterattack or ambush on his flanks and rear; therefore, security elements make maximum use of the natural obstacles strengthened with mines, contaminants, abatis, demolitions, and warning devices.

(2) *Defensive.* In the defense, the natural obstacle of the jungle serves to canalize and direct the attacker along existing trails and roads which are blocked with contaminants, demolitions, mines, and barbed wire.

g. Desert Operations. In the desert few obstacles to foot movement exist and vehicular movement is subject only to the limitations of high temperatures, salt marshes, rocky and boulder strewn areas, soft silty sand patches, and steep sandy slopes. In general conditions favor a high degree of vehicular mobility. Opposing forces seldom engage in close-in, fixed position combat. Because of the nature of desert operations, minefields and contaminants generally are the most effective artificial obstacles. Because of the general lack of natural barriers, large quantities of materials for the construction of barriers must be provided by combat service support facilities.

h. Special Forces Operations and Guerrilla Warfare. The employment of barriers may be augmented by the activities of special forces controlled, guerrilla forces engaged in overt resistance behind enemy lines or by groups engaged in subversion and covert resistance, thus capitalizing on the fact that these types of warfare are primarily offensive in nature. Guerrilla and covert resistance forces directed by special forces may be used to lay minefields along enemy avenues of approach, deny favorable assembly areas through the use of contaminants, destroy bridges, and block defiles. The capabilities of these forces should be exploited and their activities incorporated in the construction of barriers. Guerrillas also may be used to screen or defend flank barriers or to furnish early information of enemy movement toward such barriers.

i. Mountain Operations. Mountain warfare is characterized by the difficulties which terrain offers to movement. The critical features are the limited lines of communication and the passes which permit movement through the mountains. Barriers are

used to prevent the enemy from using mountain routes which permit him to strike friendly lines of communications from the flank. Demolitions (conventional or ADM), contaminants, rock slides, and mines are used to deny the use of passes and defiles for extended periods of time. Contamination and recontamination of defiles on the enemy's main lines of communication are used to isolate the area and prevent supply and the movement of reserves or reinforcements. The movement of trained enemy mountain troops around the flanks of prepared defensive areas is blocked through the use of antipersonnel mines, flame mines, and barbed wire entanglements.

j. Operations in Deep Snow and Extreme Cold. Among the peculiarities found in areas of deep snow and extreme cold are sparse settlements, lack of roads, numerous lakes and waterways, and large forested areas. The deep snow and ice and forested areas, which in themselves impede cross-country movement, influence the development of barriers since movement is generally confined to available roads, frozen lakes, and waterways. Blocking these routes tends to force movement through the heavily forested and the deep snow and ice areas. Toxic chemical munitions may be employed effectively in these areas although they have certain limitations. The employment of barriers is similar to that in other types of operations, subject to the limitations imposed by the weather and terrain.

k. Amphibious Operations.

- (1) *Offensive.* In amphibious operations, consideration should be given to the use of contaminants to further isolate the beachhead area immediately prior to and during the assault. When the beachhead is secured contaminants, minefields, and demolitions are used to supplement or reinforce available natural obstacles and to block enemy avenues of approach into the beachhead.
- (2) *Defensive.* In addition to the normal organization of the ground for the defense, underwater obstacles and mines are used to obstruct and deny likely landing beaches. Exits from the beach and avenues of approach inland are blocked with demolitions, mines and contaminants. Landing areas suitable for airborne and airmobile troops are mined and strewn with other obstacles and obstructions. Through coordination with the Navy, naval mines may be employed in coastal waters adjacent to the beaches.

l. Airborne Operations. Offensive airborne operations have an initial defensive phase. In the employment of barriers emphasis is placed on—

- (1) Prevention or delay of movement of enemy forces against the airhead with particular attention to possible avenues of approach for hostile armor. Placement of obstacles is forward of the airhead line by air, reconnaissance forces, and forces occupying the combat outposts and along the airhead line by forces defending this line.
- (2) The strengthening of natural barriers along the airhead line with artificial obstacles.
- (3) Use of all obstacles, in conjunction with preplanned nuclear fires, to canalize or delay the enemy and cause him to present renumeration targets.

m. Rear Area Security. Barbed wire, minefields, contaminants, and demolitions are used to block penetrating enemy ground elements and to isolate or contain hostile guerrilla forces. All types of obstacles such as logs, trenches, sharpened stakes, wire, and cables strung across valleys and between trees, are constructed in probable landing areas and drop zones. Since it is impossible to cover all suitable landing areas and drop zones, a careful analysis of the terrain and key installations is necessary to determine those which should receive priority.

CHAPTER 5

DENIAL OPERATIONS

Section I. PLANNING

50. Authority and Responsibility

a. General. Denial operations of the U.S. Army are predicated on the abandonment of an area, facility, or installation to the enemy. Denial operations are strategic in concept and vary widely in scope. At one extreme is "scorched earth," in which an entire region is rendered useless to the enemy, at the other extreme is temporarily limiting the use of an area or facility. The type of denial operation normally desired lies somewhere between the two extremes. Properly controlled, coordinated, and conducted, denial operations can, by selective and discriminating removal, contamination, or destruction, materially impair the enemy's ability to conduct operations and wage war. They in themselves cannot destroy his will and ability to fight. Instead they contribute by establishing conditions which make the enemy's operations more difficult, thus enhancing our plans and operations. In conducting denial operations damage to and impact on the civilian population and on resources which do not directly enhance the enemy's military effort are kept to the minimum. Indiscriminate destruction, which affects military targets only slightly but has a disastrous effect on civilian facilities may—

- (1) React to the detriment of friendly clandestine or guerilla forces operating in the area after our withdrawal.
- (2) Create resentment and hostility against our forces when we return to the area.
- (3) Require excessive rehabilitation effort after our reoccupation of the area.

b. Authority. Subject to national policies and limitations the theater commander conducts denial operations as a part of his overall campaign. He establishes the policies governing denial operations in the theater and delegates planning and execution to the service component commanders (Army, Navy, and Air Force) and to subordinate joint force commanders. It is particularly important that strategic and tactical air strikes do not destroy those facilities which might be required to support and facilitate ground and naval operations.

c. Control. Because of the tremendous capabilities for accomplishing denial with nuclear weapons, the long-range economic, political, and psychological effects, and the immediate military disadvantages of excessive destruction, major strategic denial operations are rigidly controlled by the higher echelons of command. The close relationship between major strategic denial operations and the interdiction activities of strategic and tactical air (Air Force, Navy, Marine, and Allied), long-range missiles, and naval operations makes it essential that the control of denial operations be vested in the commander with overall operational command in the area of operations—the theater commander.

d. Staff Responsibilities. General and special staff responsibilities for planning and supervising the conduct of denial operations are outlined in FM 101-5.

51. Denial Planning

a. General. Planning denial operations requires the expenditure of considerable technical effort; detailed, complete, technical information; competent technicians; adequate time; practicality; and efficient use of means. In peace it will be rare that complete, detailed denial plans of any great scope are maintained current because of the requirements for detailed coordination with the national plans of allied nations within a potential theater of operations. This coordination, which is essential to the most effective prosecution of denial operations, uses political and governmental channels involving the U.S. State Department, as well as military channels. Cultural changes generally are so rapid throughout the world that files of technical information can rarely be kept up to date with the necessary complete detailed information. Because of the rapidity with which the information becomes obsolescent, the maintenance of such files will generally be prohibited by the cost of such a program in terms of money and manpower. As a minimum, detailed denial plans are maintained however, on selected key facilities and installations, such as those involved in nuclear energy. Even in these cases many technical details are likely to be missing. In addition, denial policies and general plans for conducting denial operations are prepared and kept current. Whether planning for the conduct of denial operations in peace or war, the goal sought is the selection of those industrial, logistical, and communications systems which are most vital to the enemy's long term operations and which—

- (1) Disrupt his logistic support.
- (2) Require the diversion of major effort to reconstruction and rehabilitation.

- (3) Prevent the use of local materials, supplies, or facilities necessary for continued operations.
- (4) Force all necessary supplies, especially heavy or bulky items, such as POL and ammunition, to be transported over long and frequently disrupted lines of communications.

b. Factors Considered. U.S. Army denial operations consider the following:

- (1) The mission of the command.
- (2) Limitations and instructions of higher authority.
- (3) Current and future plans. (Barrier plans, strategic and tactical air plans, and psychological and guerrilla warfare plans.)
- (4) Enemy limitations and their effect on his capabilities. (Critical shortages, weaknesses, dependence upon facilities within the area of operations, ability to counter denials, and the effect of denials upon him strategically and tactically.)
- (5) The effect on the local population. (So our return to the area will not be unnecessarily difficult, that we do not needlessly engender the hatred of the people, and that we avoid damaging churches, schools, hospitals, and historical or cultural structures except in those cases of overriding military necessity.)
- (6) The period of denial. (Should not exceed, so far as practicable, the estimated time an area will be in enemy possession.)
- (7) Time, materials, labor, and equipment available. (Affects priorities and the manner and amount of denial that can be accomplished.)
- (8) The timing of execution. (Firmly controlled by the highest commander affected.)
- (9) Target protection required. (So sites exposed to the threat of enemy seizure can be guarded.)
- (10) Authority and responsibility for target execution. (So the units or teams actually removing, contaminating, or destroying the target know whether and under what circumstances the denial can be executed thus insuring that a major target is not lost intact or a large body of troops endangered by premature execution.)
- (11) The need for use by our own forces. (So that those facilities which are used until the last minute can be prepared in advance, guarded, and executed at the appropriate time.)

- (12) Availability of special forces controlled friendly guerillas and covert resistance forces. (To perform additional denials within their capabilities.)
- (13) Capabilities of air, naval and joint force commands to execute denial missions in support of the overall plan.
- (14) Alternate plans to assure the execution of the most essential targets.
- (15) Security to be provided denial plans. (So complete plans are not distributed below the next lower echelon and only pertinent extracts furnished to lower commanders.)

52. Denial Plans

a. Theater of Operations.

- (1) The starting point for denial planning is a strategic vulnerability study. On the basis of the enemy's strategic shortages thus disclosed and the military and the industrial resources of the area, the feasibility and scope of denial operations can be determined, policies formulated, and general plans made. (Detailed plans are based on precise, complete, detailed technical information secured by on-the-site reconnaissance performed by competent technicians.)
- (2) Denial policies formulated by the theater commander include information on specific targets and types of items to be denied, the degree of denial desired, priority of preparation and execution, and the subordinate commander responsible for planning and execution. (Normally, the army component commander and joint force commanders are given the major share of responsibility for planning and executing denial operations.) The theater denial plan should be subdivided into two parts with one part designating *significant tactical targets* or types of targets and the other part listing *significant strategic targets* or types of targets.
 - (a) A significant tactical target is one that is important because of its strategic impact as well as its impact on tactical operations as a part of a barrier system. Such a target might be a large railroad bridge over an unfordable river that is included in the theater plan to deny the use of the railway system. The same bridge also offers the enemy a means of breaching a major natural barrier and is included in a barrier plan.
 - (b) A significant strategic target is one that is important because of its strategic impact only. It has no im-

mediate impact on tactical operations. Such a target might be all of the railway locomotives in a particular area. Whether or not they are destroyed, the impact on local tactical operations is essentially the same.

b. Theater Army and Army Group. Below theater level, instructions for conducting denial operations are normally issued as an annex to a letter of instruction. For the denial of technical targets, specially trained teams may be required which may either operate directly under the control of the theater army commander or attached to the army group or field army. Based on the type and significance of the denial targets involved, the theater army and army group commanders determine those targets which will be destroyed under their direct control and those whose destruction should be decentralized to subordinate commands. Usually destruction of all significant tactical targets is assigned to those subordinate commanders who have barrier responsibilities. The degree to which a significant tactical target must be destroyed normally is greater than if only a barrier target. This is necessary if the desired denial period is to be attained. It prevents the enemy from making ready repair or restoration after the protective fires of the defenders have been removed from the site. The theater army and army group commanders make special provision to insure that those tactical commanders assigned significant tactical targets accomplish the appropriate degree of damage. For example, for tactical purposes an important railroad bridge over a wide river might be abandoned with no more damage than the destruction of a single span, whereas the destruction of two additional piers and an abutment, at least, may be required for strategic purposes. Significant strategic targets may be assigned to subordinate commands also on the basis of their capabilities and primary interest. If they are assigned to subordinate commands for execution, specially trained personnel to assist in carrying out the technical aspects of the denial may be furnished.

c. Denial Instructions. Appendix IV contains the format and examples of a denial instruction annex. The actual content of denial instructions varies, however, with the mission, the issuing command, and the overall situation. In general they include—

- (1) Applicable portions of denial plans and policies of higher headquarters.
- (2) Assignment of tasks for planning and execution to subordinate units, including priorities, timing, details of coordination, assistance to be furnished for protecting targets from enemy interference, technicians or specialists to be made available, and reports required.
- (3) Policies on the use of the local population.

- (4) Safety and security measures.
- (5) Policies for the evacuation of the local population and important individuals.
- (6) Limitations on the means of denial to be used, the degree of destruction permitted or required, and the use of contaminants and nuclear devices.
- (7) Allocation of logistical support.
- (8) Policies on the use of local resources.
- (9) Coordination required with Air Force, Navy, Joint Force Commands and Allied Forces.

d. Field Army and Subordinate Commands. At field army and subordinate command level, pertinent denial instructions and policies are integrated into the barrier plan and appear in the barrier annex to the operation plan (order). This is because most denial targets are executed by construction, destruction, or contamination, all of which technically are similar or identical to the work of preparing barriers. Normally, a separate denial annex is not published.

53. Priorities

Because of the magnitude of a denial operation and the limited time and means normally available, denial missions are given priority in the order in which they contribute to the overall operation. The necessity to preserve the integrity and conserve the combat power of our own forces strongly influences this priority. Those denials with the greatest immediate effect in reducing the enemy's combat effectiveness in the battle area generally are given priority over those which have delayed or long-range effect. For example, the denial of major airfields, bridges, or bulk POL, when tactically essential to the enemy, will take priority over the denial of major industrial facilities, particularly if the latter are susceptible also to subsequent strategic bombing. Our own logistical capability to deny during a retrograde operation and to restore during reoccupation, as well as the estimated period of the denial required also affects the assignment of priorities.

Section II. EXECUTION

54. Organization

a. Since the coordination of troop movements with the execution of obstacles and denial targets is extremely complex, it is desirable for denial targets to be destroyed to the maximum extent practicable by the same troops constructing barriers. However, targets that are technical in character and require specially trained

personnel for proper destruction may be destroyed under the direct control of higher headquarters. In such cases, detailed coordination with the tactical commanders is necessary to insure that destruction does not interfere with the operations of the troops responsible for the sector and, at the same time, the special denial teams or units are adequately protected.

b. The destructive work required for denial operations must not be confused with that required for a barrier system. Both involve extensive destruction and both may require destruction of the same facility. Consequently, there is an overlapping of objectives in the two plans. Normally tactical targets of interest to a tactical commander in accomplishing his mission are included in the barrier plan of division, corps, and field armies, unless restricted by specific orders or policies of higher commanders. Responsibility for destruction of these targets flows through command channels. Responsibility for significant tactical and strategic denial targets is not so straightforward since certain significant tactical targets may be of such overwhelming importance to the theater, theater army, or army group commander's mission that he is unwilling to delegate responsibility for destruction. For example, highway and railway bridges crossing a major unfordable river may be of such importance that a higher commander is willing to isolate some of his troops, perhaps a brigade, on the enemy side of the river, rather than risk capture of the bridge intact. On the other hand, a division commander probably would consider blowing the same bridges only after the bulk of his division was safely across.

c. There are three general methods of integrating the destruction of significant denial targets with that of barrier targets. These are—

- (1) The demolition task force method. This method employs specially trained teams or task forces, under the control of higher commands, to destroy all significant strategic targets with responsibility for destruction of significant tactical targets assigned to the field army and its subordinate commands. In this method, the commander with primary interest in each type of target directs preparation and destruction of the target and the overlapping of responsibility does not occur. For example, an important railroad and a locomotive works are located in the field army area. Both are scheduled for destruction in the theater denial plan; however, the railroad is transporting supplies to army supply points supporting successive delaying positions. The field army

commander desires to use it as long as possible. He has no interest in the locomotive works, since his supply of operational locomotives is sufficient. In this situation, destruction of the locomotive works would be accomplished by a demolition task force on orders of the theater (theater army, army group) commander. On the other hand, the railroad, primarily the bridges, would be included in the field army's and subordinate unit's barrier plans and executed, with the required degree of destruction, by army, corps, and division troops as the retrograde operation proceeds.

- (2) The technical demolition team method. This method assigns responsibility for executing all denial targets to the subordinate commander in whose area they are located and provides specially trained demolition teams to each echelon of command concerned to advise and assist in the destruction of the technical targets.
- (3) The functional demolition method. This method is a combination of the two preceding methods. Functional demolition plans are prepared at theater army level for all significant strategic targets. These are issued as annexes to the denial instructions. Each functional demolition plan contains all of the details necessary for the destruction or removal of the critical facilities of a specific industry. Responsibility for executing each functional demolition plan either is given to a specific special team or task force, divided among the various subordinate commanders, and executed with the assistance of technical demolition teams or a combination thereof. For example, in a theater of operations where petroleum production is a major critical industry, theater army denial instructions provide for the destruction of all oil fields. A functional demolition plan issued as an annex to the denial instructions would establish priorities and methods for destruction of the individual oil fields; provide technical information on the depth of the producing horizons for each well in each field, the type and quantity of pumping equipment, the size of tubing and casing in each well, and the location of pipelines in each field; and designate the organization necessary to carry out the desired destruction, i.e., size, composition, number, and assignment of demolition task forces and the delineation of the responsibilities of the subordinate commands augmented by technical demolition teams. In either case, subordinate commanders are given responsibility for de-

stroying all significant tactical targets to the desired degree of destruction.

- (4) The actual organization and method for conducting denial operations are governed by the technology of the targets. Some denial targets are so highly technical that special units must be organized and trained for the task. Some are so simple that any military unit can destroy them with no more preparation than receipt of an order. In general, however, destruction of denial targets will require some technical or special training. The decision as to the organization and method adopted is made only after a careful analysis of the factors involved including the adequacy of communications. When adequate communication is not available responsibility for destruction of all denial targets must either be delegated to the tactical commanders in the area concerned or liaison personnel, with authority to order execution, stationed at the target site.

55. Denial Means

a. Removal. Denial is certain when the enemy does not secure possession of an item and should always be considered first. Selective removal can be quite useful; however, the capability of the enemy to replace missing components or complete items must be accurately assessed. Selective removal is most profitable when the item removed is already critical to the enemy. Care must be taken to remove all like items or selected components including spares. Selective removal may require trained technicians and meticulous execution or the desired denial may not be achieved.

b. Destruction. Destruction is normally associated with the use of explosives. Destruction may be accomplished by other techniques such as fire, water, and mechanical means. They normally are used, however, only where time is available or where labor and materials are in such short supply as to preclude the use of explosives.

- (1) Destruction by burning is a valuable technique; however, many materials, considered to be flammable, will not in fact support combustion and their destruction by burning is not practicable. The advice of professional firefighters should be secured before depending on destruction by burning. The security of the overall operation must be considered because intentions to withdraw may be given away by the burning.
- (2) Rotating or reciprocating machinery usually requires lubrication to prevent damage from friction, and there

are many possibilities for destruction by removing or contaminating the lubricants. The best source of advice on the easiest and most effective way of destroying an item of machinery is a technician who is thoroughly familiar with the operation and maintenance of the machinery in question.

- (3) Many items may be damaged beyond repair by water. The effectiveness of water as a destructive means should be checked with a specialist on the item or material in question. Destruction by use of water can usually be done quietly and without disclosing future plans or intentions.
- (4) Destruction can be achieved by mechanical breaking. An informed operator can achieve maximum damage with a minimum of effort.
- (5) Destruction by cutting vital metallic members of a structure with welding torches is simple, easily learned, and positive, but the equipment required is heavy. This limits its practical use to the vicinity of the vehicle transporting the welding equipment.
- (6) Thermite grenades are useful in denying certain targets because the intense heat produced fuzes the metallic portions of the target or distorts them beyond usefulness. The use of thermite grenades must be planned in advance so that they are available. Generally execution must be accomplished by experts if the denial is to be completely successful.
- (7) Acid of the right kind, applied in the right manner, will destroy many mechanisms and materials beyond economical repair; however, it is of marginal utility and of such special or limited application that its extensive use is not practical except, possibly, clandestinely.
- (8) Many industrial items may be rendered unusable by the addition of small amounts of a contaminating or adulterating substances. No one substance is universally applicable, therefore technical familiarity with the target is required.
- (9) Demolition by explosives is the most common method of destruction. It is certain, rapid, economical in cost, time, and materials and is effective against most targets. For details of the employment of explosives to accomplish destruction see FM 5-25.

c. Contamination. Contamination by chemical, biological, or radiological agents increases the denial effect by forcing the enemy

to decontaminate or to wait until the contaminants have decayed to a safe level. Contaminants also have the advantage of rendering an item temporarily unusable; however, items can be decontaminated. Further, the contaminating agents will deteriorate and lose their effectiveness unless periodically refreshed. For details of employment of chemical, biological, and radiological contaminants see FM 3-5.

d. Atomic Demolitions. With atomic demolition munitions, it is possible to destroy targets which otherwise would be difficult or impossible to destroy. Frequent denial targets for the employment of ADM are airfields, defiles, underground installations, and tunnels. Facilities, such as large masonry and concrete bridges, port complexes, POL storage and production facilities, supply installations, railroad facilities, dams, and industrial facilities are relatively infrequent ADM targets. They require either very high yields or a large number of weapons thus subjecting large areas to fallout, are located near urban areas, have insufficient "military worth" to justify expenditure of ADM, or have a high vulnerability to conventional demolitions. For details of the employment of ADM, see FM 5-26.

Section III. OPERATIONS

56. General

a. The difficulty in conducting denial operations in the populated temperate zone is almost in direct proportion to the density of population. Many items which are critical to military operations are likewise vital to the civilian population and their economy. Many are privately owned and controlled. Personal interest of those in possession often conflicts with patriotism. This must be recognized and denial operations conducted in such a manner that the impact is minimized as much as possible.

b. Denial operations may be used to a limited extent offensively and defensively; however, they are of prime importance in retrograde operations. Denial operations seek to reduce the enemy's capability to conduct operations and reestablish favorable conditions for offensive action. They serve to gain time and reduce the enemy's will and ability to continue combat by denying him the use of critical areas and rendering inoperative such items as the transportation, industrial, or communications systems. Denying any benefit from these systems for an extended period of time prevents or hinders the enemy's use of—

- (1) Areas for purposes of assembly, maneuver, counterattack, reinforcement, or logistical support.

- (2) Installations or facilities thus delaying his operations.
- (3) Items of tactical or strategic value thus reducing the effectiveness of his operations.

57. Special Operations

a. The operational environments of special operations are such that, except in desert operations, the forces involved are denied their normal ability to mass and maneuver. In amphibious and airborne operations, the forces involved seek to overcome these disadvantages by denying vital terrain and facilities thus limiting the counterattack capabilities of the enemy. In jungles, deserts, mountains, and deep snow critical importance is attached to the limited number of static installations and facilities. Their acquisition and use generally are essential to the security or further operations of the forces in the area and may determine the outcome of battle. To prevent enemy use of critical targets, denial operations will vary from complete destruction to temporarily limiting their use, depending on their relative importance to future operations. In such operations, the execution of denial missions behind enemy lines by special forces controlled friendly guerrilla forces is particularly effective.

b. Special operations may be initiated for the specific purpose of denying critical areas, installations, or facilities to the enemy.

58. Denial Target Systems

a. General. Any industrial, logistical, or communication systems, and areas can be denied to an enemy; however, there are usually certain key elements of each potential denial target system which can be attacked with the most renumerative results. The basic concept of attacking vital components of a denial target system is to render the entire system inoperative, for the desired period of time. To render a particular system inoperative the various individual facilities, installations, or structures (targets), which serve a special purpose in the system at a particular location, must be determined. Targets must be selected with care to insure that they are mutually supporting and that the enemy cannot readily compensate for their removal or destruction.

b. Areas. Areas may be denied to the enemy, but the short period of time such denial is effective, combined with the enemy's capability to pass through such areas quickly, following withdrawal of the defenders, makes area denial essentially a barrier technique rather than a strategic denial measure. Areas may be denied by—

- (1) Demolitions which destroy access to the area. ¹

- (2) Chemical, biological, or radiological contaminants, including contamination resulting from the detonation of nuclear weapons.
- (3) Flooding.
- (4) Delayed action explosives.
- (5) Construction of obstacles which render the area more desirable to avoid than to clear and occupy.
- (6) Isolation through interdiction or destruction.
- (7) Weapons fire.
- (8) Maneuver.

c. Installations and Facilities. For both strategic and tactical reasons, denial of critical installations and facilities are desirable in most situations. The denial targets selected are integrated into the overall strategic and tactical concepts of the theater operations plan and are executed in accordance with war objectives.

- (1) *Railway system.* Effective denial of the railway system disrupts one of the enemy's principal transportation means. It necessitates a systematic denial of major structures, facilities, locomotives, and rolling stock which are essential to the system's operation. To deny a rail net, it is necessary to cut all rail lines running generally parallel to the axis of enemy advance. The number of complete cuts required is dependent upon the delay desired. The best specific targets are major bridges, tunnels, and defiles. Ordinarily, it is unremunerative to destroy track or roadbed. The most important supporting targets are railway terminal facilities, such as round-houses, shops, and marshalling yards; locomotives; and rolling stock.
- (2) *Highway system.* If the railroad system is successfully denied, the enemy is forced to depend upon other means of transportation to furnish adequate logistical support for his advance. Highway system denial complements railway denial and is of considerable significance even though restoration of the system by replacement or repair of bridges and other structures generally is simpler and quicker than is restoration of the rail system. Denial of the highway system, therefore, is not effective for as long a time as railway system denial. Specific targets best suited for denial of a highway system are major bridges, tunnels, and defiles.
- (3) *Airway system.* The airway system is highly important to the enemy for tactical and strategic operations as well as for limited logistical support. Other than aircraft,

which are evacuated or destroyed, the specific targets in the system are the airfields. These can be denied by cratering the runways and destroying critical supporting facilities. ADM are particularly suitable for this mission.

- (4) *POL system.* POL system denial includes, in addition to the destruction of bulk POL, the destruction of terminal storage, producing, refining, and dispensing facilities, as well as facilities for transporting bulk POL from one area to another. The amount of destruction required varies widely, dependent upon the particular area under consideration, since destruction of a single key facility may eliminate the need for other destruction. For example, in an area lacking in oil production but having refineries, the enemy would be unable to use the refineries if all bulk POL handling and storage facilities were destroyed.
- (5) *Electric power system.* Denial of major electric power systems impair the operation of heavy industries within the area. Denial should provide for the systematic destruction of key generating plants where practicable. Since transformer stations form the heart of transmission systems, they are usually the most suitable denial targets for disrupting power service with the least expenditure of effort. The destruction of electric power systems has a considerable impact on the local civilian population which must be considered also.
- (6) *Communications system.* Disruption of major communications systems should provide for the destruction of telephone and telegraph exchanges, repeater stations, and radio stations only. More complete denial has a greater effect on the civilian population than on the enemy military effort.
- (7) *Inland waterways system.* In well developed areas, particularly in Western Europe, inland waterways are highly developed and carry a large proportion of total freight traffic. The waterways system can be denied by destroying the dams, siphons, aqueducts, embankment or levee walls, locks and gates, barges, and other floating craft, as well as by obstructing the waterways themselves.
- (8) *Utilities.* The destruction of water, gas, and sewage systems ordinarily has little or no military effect on the enemy but has a most harmful effect on the local population. Unless a marked military advantage accrues,

such as denial of water to the enemy in a desert area, utility systems should not be impaired.

- (9) *Ports*. Ports can be destroyed by atomic or conventional demolitions; scuttling ships in harbors, across bars, alongside quays, piers, and docks; removal or destruction of cranes, lighters, tugs, rail facilities, channel markers, and communications equipment; removal of pilots and key navigational personnel; and by destruction of bulk POL handling equipment.

59. Materiel

a. The destruction of materiel is a command decision and, except in extreme cases, is done only on authority of a division or higher unit commander. The general policy is maximum evacuation and minimum destruction.

b. Local civilian materiel items of strategic or tactical value should be denied the enemy, particularly if he is critically short of such items and requires the local items to conduct further operations. The following general classes are among those which normally are denied to the enemy.

- (1) Nuclear energy facilities and related equipment.
- (2) Bulk POL stocks.
- (3) Locomotives and rolling stock.
- (4) Critical industrial components, such as industrial diamonds, electronic equipment, ball bearings, and jet engines.
- (5) Highway transport equipment.
- (6) Floating equipment and all harbor facilities, such as hoists, cranes, locks, and ship repair facilities.

c. In retrograde operations, military equipment, materiel, and weapons are evacuated if at all possible. They are destroyed only when they must be abandoned to the enemy. To reduce the task to manageable proportions, minimum essential supplies and equipment are carried by those combat elements in contact with the enemy. Plans for denying military items are included in all unit SOP and operation plans by providing for the evacuation of excess supplies and equipment sufficiently in advance to prevent their loss to the enemy or their destruction in the event of an emergency. Destruction is so planned that when evacuation or complete destruction is impossible, the same part or assembly is destroyed on all similar items of equipment. This prevents some of the items from being placed back in operation by the simple expedient of cannibalization. When possible, mobile equipment is demolished in defiles, on airfield runways, or other locations where they assist

in impeding enemy movement. Contaminants are employed to the maximum to delay enemy repair or rehabilitation. Booby-traps are used to the extent time permits. Destruction of captured enemy equipment has priority over the same type of friendly equipment.

60. Personnel

The evacuation of civilian political leaders is a moral responsibility if, by remaining, they would be harmed by the enemy. Scientific and technical personnel are evacuated also, dependent upon their usefulness to the enemy or to friendly forces.

61. Planning Factors

Planning factors for specific types of denial targets are contained in FM 101-10. These factors may be used for the rapid calculation of time, labor, materials, and transportation required to deny targets of similar qualities and characteristics. Principal basic materials required, such as explosives, can be computed using the factors; however, they do not provide a complete bill of materials. Factors are not included for computing supplementary requirements for such items as searchlights, air compressors, earth augers, or other types of equipment; and auxiliary demolition materials such as caps, demolition wire, and blasting machines.

APPENDIX I

REFERENCES

JCS Pub 1	Dictionary of United States Military Terms for Joint Usage.
JCS Pub 2	Unified Action, Armed Forces, UNAAF.
AR 320-5	Dictionary of United States Army Terms.
AR 320-50	Authorized Abbreviations and Brevity Codes.
FM 3-5	Chemical, Biological, and Radiological (CBR) Operations.
FM 5-15	Field Fortifications.
FM 5-25	Explosives and Demolitions.
FM 5-26	Employment of Atomic Demolition Munition (ADM) (U).
FM 5-31	Use and Installation of Boobytraps.
FM 5-34	Engineer Field Data.
FM 20-32	Land Mine Warfare.
FM 20-32A	Land Mine Warfare (U). (When published)
FM 21-5	Military Training.
FM 21-6	Techniques of Military Instruction.
FM 21-30	Military Symbols.
FM 27-10	The Law of Land Warfare.
FM 30-10	Terrain Intelligence.
FM 31-12	Army Forces in Amphibious Operations (The Army Landing Force).
FM 31-15	Operations Against Irregular Forces.
FM 31-21	Guerrilla Warfare and Special Forces Operations.
FM 31-25	Desert Operations.
FM 31-30	Jungle Operations.
FM 31-50	Combat in Fortified Areas and Towns.
FM 31-60	River-Crossing Operations.
FM 31-70	Basic Cold Weather Manual.
FM 31-71	Northern Operations.
FM 31-72	Mountain Operations.
FM 41-10	Civil Affairs Operations.

FM 54-2	Division Logistics and the Support Command.
FM 57-10	Army Forces in Joint Airborne Operations.
FM 57-35	Airmobile Operations.
FM 61-100	The Division.
FM 100-5	Field Service Regulations—Operations.
FM 100-10	Field Service Regulations—Administration.
FM 100-15	Field Service Regulations—Larger Units.
FM 101-5	Staff Officers Field Manual, Staff Organization and Procedure.
FM 101-10	Staff Officers Field Manual, Organizational Technical, and Logistical Data. Parts I, II, and III.
FM 101-31	Staff Officers Field Manual, Nuclear Weapons Employment (U).
TM 3-200	Capabilities and Employment of Toxic Chemicals.
TM 3-210	Fallout Prediction.
TM 3-300	Ground Chemical Munitions.
TM 5-220	Passage of Obstacles Other Than Minefields.
TM 5-310	Military Protective Construction.
TM 9-1910	Military Explosives.
TM 9-1940	Land Mines.
TC 3-1	Ground Flame Field Expedients.
DA Pam 108-1	Index of Army Motion Pictures, Film Strips, Slides, and Phono-recordings.
DA Pam 310-1	Military Publications: Index of Administrative Publications.
DA Pam 310-3	Military Publications: Index of Training Publications.
DA Pam 310-4	Military Publications: Index of Technical Manuals.

APPENDIX II

ARTIFICIAL OBSTACLE NUMBERING SYSTEM

1. First Symbol

a. List the number and/or letter designation of the headquarters (army, corps, division, brigade, or battalion) authorizing or directing installation of the obstacle.

b. In those instances where company sized units are delegated authority to install obstacles, the unit letter designation is placed in parenthesis immediately in front of the designation of the parent unit and made a part of the symbol, e.g., (C) 21-Inf.

c. Follow the symbol with a "dash".

2. Second Symbol

a. For brigades and higher, list the standard tactical size symbol for the headquarters authorizing or directing installation of the obstacle, e.g., XXXX for army.

b. When necessary, special corps identification is made a part of the symbol, e.g., XXX (Abn) for airborne corps.

c. When divisions with identical numbers are assigned to the same field army the abbreviation for type of division is placed in parenthesis and made a part of the symbol, e.g., XX (Armd), XX (Inf), XX (Mech), XX (Abn).

d. For brigades, the designation of the division is placed in parenthesis and made a part of the symbol, e.g., X (32d Armd), X (14th Inf), X (55 Mech), and X (152 Abn).

e. For regiments and battalions, the abbreviation for the arm or service is made a part of the symbol, e.g., Inf for Infantry, Arty for Artillery, Cav for Cavalry, and Engr for Engineers.

f. Follow the symbol with a "dash".

3. Third Symbol

List the sequential numerical designation of the obstacle as assigned by the headquarters authorizing or directing installation.

4. Designation of Obstacle Status

Though not actually a part of an obstacle's designation, its status can be reported and recorded by the use of appropriate

letters, e.g., (P) proposed, (U) under preparation, (R) ready but passable, or (E) executed.

5. Numbering Obstacles

In the planning stage, a number is assigned to an obstacle by the headquarters authorized to direct its installation. This number remains with the obstacle throughout its various phases of development. The installing unit, if it is not the authorizing unit, need only know that the obstacle is authorized by its parent unit, e.g., 1st Bde, 20th Inf Div, authorizing obstacle 1-X (20 Inf)-15, a minefield. From this point on, the important element is the obstacle number which, as far as the installing unit is concerned, is the subnumber 15 and its status which currently is (P). In this instance, this number is the minefield number and is placed in that space on DA Form 1355 (Minefield Report). For security reasons, the first two symbols of the number 1-X (20 Inf) should not be placed on the minefield report as long as it is subject to capture by the enemy. They can be added later. Communication between the brigade and other headquarters, concerning the minefield, can be made in the clear without compromising friendly order of battle, e.g., "change status my project 15 from (P) to (U)." If an obstacle is authorized by the 10th Infantry Division, it can be referred to in the clear as "Division Project 15-(U)".

6. Use of Unit Code Names

When necessary, radio code names can be used to facilitate reporting and differentiating between obstacles, e.g., "Project Mace 15-(U)" meaning battalion (brigade, division, corps, army) project 15 is under preparation.

7. Examples

Complete obstacle numbers assigned under this system combined with their status are as follows:

- a. 30-XXXX-75-E 30th Army, obstacle number 75 executed.
- b. 3-X (66 Mech)-7-U 3d Brigade, 66th Mechanized Division, obstacle number 7, under preparation.
- c. 2/25-Inf-9-R 2d Battalion, 25th Infantry, obstacle number 9, ready but passable.
- d. (B) 19-Armor-6-P Company B, 1st Tank Battalion, 19th Armor, obstacle number 6, proposed.

e. 2/2-Cav-5-E

2d Reconnaissance Squadron, 2d Cavalry, obstacle number 5, executed.

f. 3/7-Arty-14-U

3d Howitzer Battalion, 7th Artillery, obstacle number 14, under preparation.

APPENDIX III

BARRIER PLAN ANNEX

Format: Barrier Plan Annex to Operation Plan or Order.

.....
(Classification)

Copy No.
Issuing Headquarters
Place
Date and Time
Message Reference Number

Annex (Barrier Plan) to Operation Plan (Order)
Reference: (Maps, charts, and other pertinent documents).

1. **SITUATION.** This paragraph contains information of the general overall situation as may be essential for subordinates to understand the current situation and the relationship of the barrier plan to tactical plans.
 - a. **Enemy forces.** Include pertinent information regarding composition, disposition, location, movements, estimated strengths, identifications, and capabilities. Frequently shown by reference to an intelligence plan or annex.
 - b. **Friendly forces.** Include pertinent information on the responsibilities of commanders of friendly forces which may affect execution of the barrier plan. Frequently shown by reference to an operation plan (order).
 - c. **Attachments and detachments.**
 - d. **Assumptions.** Include those assumptions required to provide a common basis for planning.
2. **MISSION.** This paragraph is a clear, concise statement of the barrier task to be accomplished by the command and its purpose.
3. **EXECUTION.** In the concept subparagraph include the designation of any specific barriers deemed vital to the command as a whole, the general location concept of barriers to be constructed (frequently shown by reference to an overlay or overprinted map), and the general priority of barrier construction. In separate lettered subparagraphs, give the

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(Classification)

specific task or responsibility of each subordinate command. List each barrier, specific denial target (when applicable) by category (significant tactical targets and significant strategic targets), and desired degree of destruction, specific priority of construction or execution, date or period within which construction or execution must be accomplished, code numbers of specified obstacles, and other appropriate instructions. In the final subparagraph, titled "Coordinating instructions," give details of coordination and control measures applicable to two or more elements of the command or to the command as a whole. This subparagraph may include restrictions or limitations on the employment of certain artificial obstacles by type or area, such as minefields, nuisance mines, boobytraps, chemical, biological, or radiological contamination, and atomic demolition munitions; gaps, lanes, important routes to be kept open, and areas important to the command for tactical and combat service support operations as well as future operations; any required coordination; code systems and instructions for numbering individual obstacles and reporting state of readiness (if not SOP items); authority for the construction of additional barriers, if desired; instructions regarding the submission of detailed barrier and obstacle plans; and instructions relative to the security of barrier plans. In this subparagraph refer to appropriate appendixes such as atomic demolition appendix, minefield location appendix, contaminants appendix, and demolitions appendix. Appendixes will include complete details of execution.

4. ADMINISTRATION AND LOGISTICS. This paragraph contains instructions concerning the administrative matters and logistical arrangements for the execution of the barrier plan such as allocation of indigenous labor, materiel, and transportation and use of local resources. Reference may be made to an administrative appendix, annex, or plan (order).
5. COMMAND AND SIGNAL. This paragraph contains instructions concerning signal and command including, when appropriate, reference to an SOP, SOI, or annex to an existing plan (order). This paragraph also contains instructions for reports of intended location, extent, and type of minefields, demolitions, contaminants, and other obstacles as well as acknowledgment instructions.

Appendixes

Distribution

Authentication

Example: Barrier Plan Annex to Operation Order

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071000 Apr 19....

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Annex F (Barrier Plan) to OPORD 14

Map: GERMANY, 1:100,000, DETMOLD-KASSEL

1. SITUATION

a. Enemy forces. Annex A (Intel) to OPORD 14

b. Friendly forces.

(1) OPORD 14.

(2) 523d Engr Cmbt Gp supports I Corps in preparation barrier TU.

(3) 402d Hwy Trans Gp supports I Corps with two Trans Trk Bn from 071000 to 102000 April.

(4) 1st AGP personnel exploits technical intelligence targets in I Corps zone.

c. Attachments and detachments: None.

d. Assumptions: None.

2. MISSION. Corps execute barrier system in sector to delay, impede, and canalize enemy movement.

3. EXECUTION.

a. Concept of operations.

(1) I Corps employs barriers aggressively within available materiel, transportation, and troop strength to facilitate accomplishment of assigned mission making maximum use of natural barriers and obstacles and locally available materials.

(2) App 1, Barrier Location Concept, indicates the general trace of corps required barriers, including gaps and lanes, which, unless otherwise specified, will be constructed in the general order of priority as follows:

(a) Covering and forward barriers.

(b) Rear barrier.

(c) Flank barriers.

(d) Interior barriers.

b. 20th Inf Div.

Barrier or Target	Priority	Estimated Completion Date	Remarks
BCD	1	092000 Apr	Prepare DIEMEL River Bridges for demolition; after withdrawal 23d Armd Div demolish on div order.
CN	2	102000 Apr	Demolish WARME River Bridges on div order.

c. 55th Mech Div.

* * * * *

e. 23d Armd Div.

As corps covering force, plan and execute covering barriers, employing mines, including nuisance mines, demolitions, and other obstacles to gain maximum delay.

f. 201st Armd Cav.

Barrier or Target	Priority	Estimated Completion Date	Remarks
FGHI	1	092000 Apr	Prepare DIEMEL and WESER River Bridges for demolition; after withdrawal 23d Armd Div, demolish on regt order.
IR	2	102000 Apr	Prepare WESER River Bridges for demolition; demolish on regt order.

g. Corps Engr:

(1) 534th Engr Cmbt Gp

Barrier or Target	Priority	Estimated Completion Date	Remarks
Target 1-XXX-1 (EDER Dam)	1	092000 Apr	Prepare EDER Dam for atomic demolition; demolish on corps order.
UV	2	102000 Apr	Prepare demolitions, mine and improve natural obstacles EDER and FULDA Rivers. 523d Engr Comb Gp supports.
IR	2	102000 Apr	Spt 201st Armd Cav.
RSV	3	102000 Apr	Prepare demolitions, minefields, and craters for dams, fords, and other crossing points on WESER River.
NOPQR	4	102000 Apr	

(2) 535th Engr Cmbt Gp

* * * * *

h. Coordinating instructions.

- (1) Locate barriers so that they offer minimum interference to the execution of tactical operations to include withdrawal of 23d Armd Div. Provide sufficient gaps in interior barriers so that reserves can move freely in rear of or within the battle area.
- (2) Coordinate location of barriers along boundaries, including gaps and lanes.
- (3) Construct additional barriers in sectors. Coordinate gaps and lanes with counterattack plans.
- (4) Close corps specified gaps and lanes behind FEBA only on corps order.
- (5) Request authority for additional gaps and lanes desired in corps directed barriers.
- (6) Execute bridge and other transportation facility demo-

litions in rear of the FEBA only after corps clearance or release of control of route or routes.

- (7) Prepare plans for the use of chemical contaminants to increase the effectiveness of obstacles and barriers. Corps approval is required before actual employment. Use of napalm authorized.
- (8) Div security forces authorized to employ nuisance mines forward of FEBA after withdrawal 23d Armd Div. Nuisance mines behind the FEBA are not authorized.
- (9) Security forces demolish all highway bridges and railroad facilities during delay to main battle area.
- (10) Keep the destruction of population centers and communications, transportation, utilities, mining, factories, and installations to a minimum, other than those specified below. Secure corps approval prior to planning any destruction which may have strategic aspects.
- (11) Barrier construction will begin without delay. Improvement of barrier system will continue during occupancy of battle area.
- (12) Assist 1st AGP personnel in exploiting technical intelligence targets to the fullest extent practicable compatible with assigned mission.
- (13) Evacuate local civilian nuclear research scientists to FRANKFURT, if necessary to prevent capture.
- (14) Evacuate principal governmental officials of national, provincial and municipal agencies to FRANKFURT, if necessary to prevent capture.
- (15) Forward complete barrier plans to this headquarters by 102000 Apr; completed portions will be shown separately.
- (16) Designate targets and report change in status in accordance with target numbering system in corps SOP.
- (17) Do not distribute complete barrier plans below Div or Armd Cav Regt CP; appropriate extracts authorized as far forward as Bde and Bn CP.
- (18) Employ ADM's consistent with nuclear weapons allocations and SOP safety precautions. Notify corps at least three hours prior to detonation. Forward nuclear demolition plans to corps by 102000 Apr.

- (19) App 1, Overlay, Barrier Location Concept.
- (20) App 2, Minefield Location Plan.
- (21) App 3, Chemical Contaminants Plan.
- (22) App 4, Demolitions Plan.
- (23) App 5, Atomic Demolitions Plan.

4. ADMINISTRATION AND LOGISTICS.

- a. Army ADMINO 5.
- b. Exploit civilian labor to the maximum; however, use of civilians forward of Bde and Regt rear boundaries is prohibited.

5. COMMAND AND SIGNAL

- a. Signal. Index 7, SOI.
- b. Reports and records.
 - (1) Minefields. Appendix 2, Minefield Location Plan.
 - (2) Chemical Contaminants. Appendix 3, Chemical Contaminants Plan.
 - (3) Demolitions. Appendix 4, Demolitions Plan.
 - (4) Atomic Demolitions Plan. Appendix 5, Atomic Demolitions Plan.
 - (5) Other obstacles. Report location, extent, type, estimated time of completion, and estimated delay to be accomplished.

Acknowledge.

WISE
Lt Gen

App: 1—Barrier Location Concept
2—Minefield Location Plan
3—Chemical Contaminants Plan
4—Demolitions Plan
5—Atomic Demolitions Plan (omitted)

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Appendix 1 (Barrier Location Concept) to Annex F (Barrier Plan) to OPORD 14

(Classification)

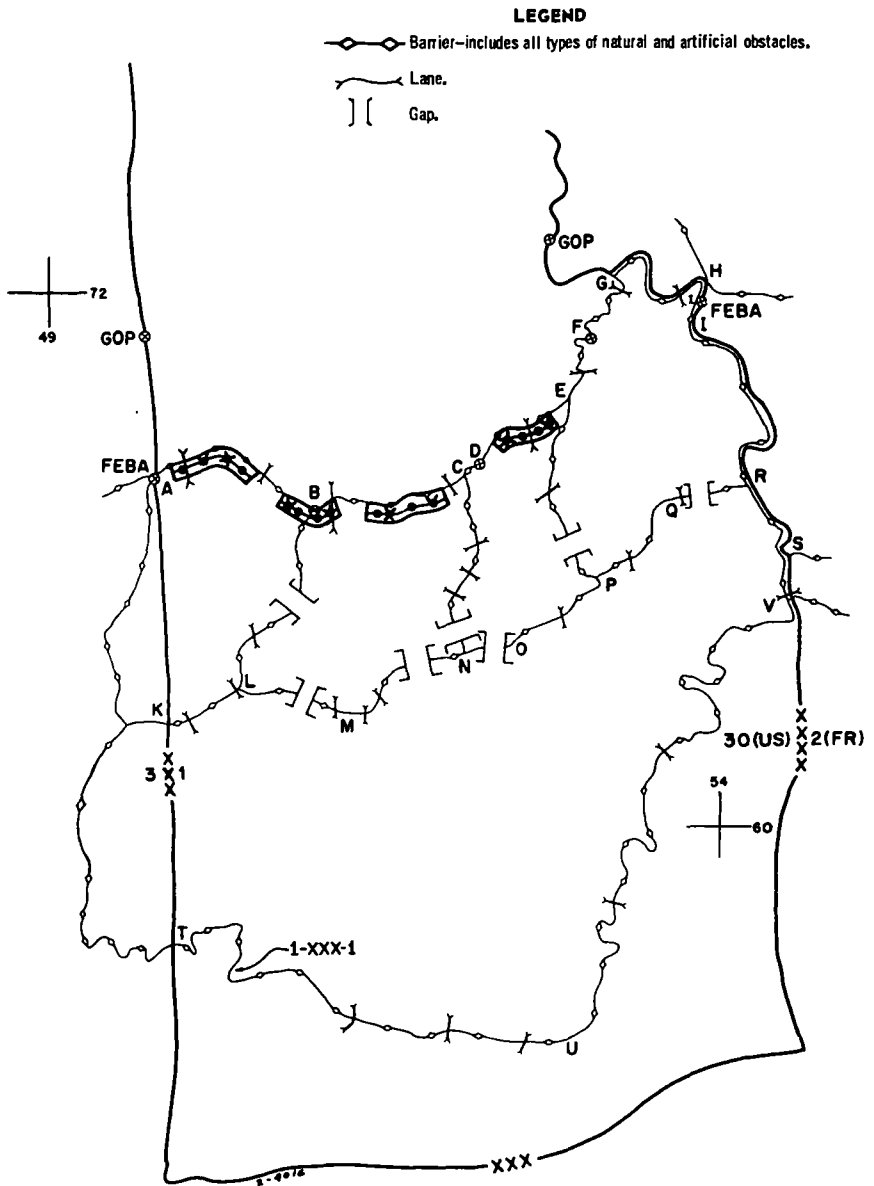


Figure 13. Barrier location concept.

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Appendix 2 (Minefield Location Plan) to Annex F (Barrier Plan)
to OPORD 14

MAP: GERMANY, 1:100,000 DETMOLD-KASSEL

1. SITUATION

a. Enemy forces, Annex A (Intel) to OPORD 14

b. Friendly forces. OPORD 14

2. MISSION. Corps lays minefields in sector to delay, impede,
and canalize enemy movement.

3. EXECUTION

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(Classification)

(App. 2 to Annex F to OPOD 14)

a. Target Tabulation.

Barrier	Priority	Estimated Completion Date	Location		Approx Mines		Approx ^o Plt Hrs	Prep Unit	Remarks
			Area Name	Grid Coord	AT	APers			
ABCDEF GHI	1	092000 Apr	Scherfeder Wald to Lippoldsberg	MC9806 NC3820	60,000	240,000	2000	AB-55th Div BD-20th Div DF-72d Div FI-201st Regt	Div Cmdrs and CO 201 Armd Cav integrate minefields into the overall unit defense along FEBA.
LM	2	102000 Apr	Phillipinendorf	NB0987	9,000		150	535th Engr Gp	Survey minefield sites, wire in, stake center- lines, stockpile mines, and prepare to lay. Field will be laid by standby personnel on corps order.
	*	*	*	*	*	*	*	*	*

Minefield Total	156,000	240,000
Total Nuisance Mining at Demolition Sites (Dml Plan).....	7,150	7,150
Total	163,150	247,150

* Estimated on site labor requirements for minelaying only.

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(Classification)

b. Coordinating instructions.

- (1) Use nonmetallic mines and antilift devices to the maximum available. Use of trip flares in lieu of APers mines is encouraged where requirement for warning rather than casualty effect predominates.
- (2) Security and safety.
 - (a) Cover active minefields by security elements or friendly observation. Laying units are responsible for accurate recording and guarding to prevent friendly personnel or vehicles from entering live fields.
 - (b) Until passed through by all withdrawing forces, clearly mark all minefield lanes with standard lane markers.
 - (c) Report removal or alteration of any minefield immediately to this headquarters.
- (3) Where mines containing less than 20 pounds TNT equivalent are laid to stop enemy armor, bury either sufficient mines or augmenting explosive charges in each hole in close contact to make a total of over 20 pounds explosive content. Fuze all top mines.
- (4) Additional Mining. Corps supporting units make reconnaissance and survey their respective barrier lines for possible employment of additional defensive, phony, and nuisance minefields other than for demolition targets or facilities denial; forward recommendations and requests to this headquarters by 092000 hours April for approval to install.

4. ADMINISTRATION AND LOGISTICS

- a. Army ADMINO 5.
- b. Supply. Draw mines required, over and above stocks presently maintained by units, from supply points and depots as indicated in Annex C (Engineer) to Army ADMINO 5.

5. COMMAND AND SIGNAL

- a. Signal. Index 7, SOI.
- b. Reports and Records. Submit required reports of intent to lay, initiation, completion, and change by fastest means available consistent with signal security. Follow with written standard record in prescribed number of copies as soon as possible on all but protective minefields.

Acknowledge.

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071000 April 19....
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Appendix 3 (Chemical Contaminants Plan) to Annex F (Barrier Plan) to OPORD 14

Map: GERMANY 1:100,000 DETMOLD-KASSEL

1. SITUATION

- a. Enemy forces Annex A (Intel) to OPORD 14
- b. Friendly forces OPORD 14

2. MISSION. Corps plans for and employs on order chemical agents and chemical contaminants in sector to increase effectiveness of or create barriers in zone to delay, impede and canalize enemy movement.

3. EXECUTION.

- a. Target Tabulation:
 - (1) Chemical Minefield Location Plan. (HD Filled Cml Mines)
- b. Nuisance Mines: (HD Filled Cml Mines)

(Classification)

Barrier	Priority	Estimated Completion Date	Location		Approx Mines	Est Plat Hrs	Prep Unit	Remarks
			Area Name	Grid Coord				
AB	1	092000 Apr	Scherfeder Wald to Warburg	MC9806	10,000	100	55th Div	Div Cmdrs & Co 201st Armd Cav integrate minefields into the overall unit defense along the FEBA. Fields will be laid for static firing. All or part of cml mines may be fuzed for trip release.
BD	1	092000 Apr	Warburg to Lamerden	NC1004 NC1004 NC2309	12,000	120	20th Div	
LM	* 2	* 102000 Apr	* Phillipinendorf	* NB0987	* 900	15	* 535th Engr	
	*	*	*	*	*	*	*	*

(Classification)

Barrier	Priority	Estimated Completion Date	Location		Target Designation	Mines Req'd	Sqd Hr Req'd	Prep Unit	Remarks
			Place Name	Grid Coord					
AB	1	092000 Apr	Wrexen	MC999070	55-XX-14, Hwy Bridge	20	½	55th Div	
BL	2	102000 Apr	Volkmarsen	NB079962	55-XX-15, Hwy Bridge	20	½	55th Div	
BCD	1	092000 Apr	Warburg	NC105038	20-XX-7, Hwy Bridge	20	½	20th Div	
	*	*	*	*	*	*	*	*	*

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(Classification)

c. Consolidated requirement for HD filled chemical mines.							
Unit				No Required		Plt hours	
55th Inf Div				10,120		101	
*	*	*	*	*	*	*	*
Total				49,820		554	

d. Coordinating instructions.

- (1) Use antilift devices to the maximum extent practicable. Chemical mines may be used to boobytrap HE mines.
- (2) Make provision for static firing of chemical mines when concentrated in minefields. Avoid premature firing of chemical elements of minefields during small scale probing attacks.
- (3) Use field expedient flame devices to the maximum extent practicable to reinforce road craters, abatis, and other obstacles, and to delay or prevent penetration of minefields. Flame flares may be prepared and emplaced for illuminating purposes.
- (4) Security and safety.
 - (a) Keep active minefields under friendly observation and covered by flat trajectory weapons fire where possible. Laying units are responsible for accurate marking and recording and for preventing friendly forces from entering live minefields. Remove minefield markers forward of FEBA upon withdrawal of the general outpost.
 - (b) Close gaps and lanes in barriers in rear of FEBA only on corps order.
 - (c) Report removal or alteration of any chemical minefield immediately to this headquarters.
- (5) Additional Contaminants. Corps supporting units make reconnaissance and survey their respective barrier lines for possible employment of additional defensive and nuisance minefields other than for demolition targets or facility denial. Forward recommendations and requests to this headquarters by 092000 April for approval to install.

4. ADMINISTRATION AND LOGISTICS

- a. Army ADMINO 5.
- b. Supply. Draw mines and contaminants required from supply points and depots as indicated in Annex B, (Chemical) to Army ADMINO 5.
- c. Decontamination units. Army ADMINO 5.

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(Classification)

5. COMMAND AND SIGNAL

- a. Signal. Index 7. SOI.
- b. Reports and Records. Report intended location, agents used, extent, type, and density, estimated time of completion, and delay to be accomplished. Follow with written standard report or record forms without delay in prescribed number of copies.

Acknowledge.

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Appendix 4 (Demolitions Plan) to Annex F (Barrier Plan) to
OPORD 14

Map: GERMANY, 1:100,000, DETMOLD-KASSEL

1. SITUATION

- a. Enemy forces, Annex A (Intel) to OPORD 14.
- b. Friendly forces. OPORD 14.

2. MISSION. Corps prepares and executes demolitions in sector on order to delay, impede, or canalize enemy movement.

3. EXECUTION.

a. Target Tabulation:

Barrier	Priority	Estimated Completion Date	Location		Target	Explosives Req'd. (Lbs)	Nuisance Mines Rqd		Sqd Hrs Req'd	Prep Unit	Remarks
			Place Name	Grid Coord			AT	APers			
AB	1	092000 Apr	Wrexen	MC999070	55-XX-14 Hwy Bridge	2000	50	50	3	55th Div	Demolish on Div order
BL	2	102000 Apr	Volkmarsen	NB079962	55-XX-15 Hwy Bridge	2000	50	50	3	55th Div	
			Volkmarsen	NB080963	55-XX-16 Water Mill	2000			2	55th Div	
			Kulte	NB050940	55-XX-17 Hwy Bridge	2000	50	50	3	55th Div	Demolish on Corps order
*		*	*		*	*			*		*

b. Execute bridge and other transportation facility demolitions in rear of the FEBA only after corps clearance or release of control of route or routes.

(Classification)

(Classification)

4. ADMINISTRATION AND LOGISTICS.

- a. Army ADMINO 5.
- b. Draw explosives and mines required in excess of current stocks carried in units from supply points and depots as indicated in Annex C (Engineer) to Army ADMINO 5.

5. COMMAND AND SIGNAL.

- a. Signal. Index 7, SOI.
- b. Report location, type, extent, and estimated time of completion of demolitions projects without delay in prescribed number of copies on standard report or record forms.

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APPENDIX IV

DENIAL PLAN ANNEX

Format: Denial Plan Annex to Letter of Instruction, Operation Plan, or Order.

.....
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Place
Date and time
Message reference number

Annex (Denial Plan) to Letter of Instruction (Operation Plan, Operation Order)

References: (Maps, charts and other pertinent documents).

1. **SITUATION.** This paragraph contains that information on the general overall situation which is essential to subordinates for understanding the current situation and the relationship of the denial plan to the tactical plans.

a. **Enemy forces.** Includes pertinent information regarding composition, disposition, location, movements, estimated strengths, identifications, and capabilities. Frequently shown by reference to an intelligence plan or annex.

b. **Friendly forces.** Includes pertinent information on the responsibilities of commanders of friendly forces which may affect execution of the denial plan. Frequently shown by reference to an operation plan (operation order, letter of instruction). Support given by Navy, Air Force, and Joint Force commands is included also.

c. **Assumptions.** Includes those assumptions used as a basis for the plan. (Normally applicable only to higher command echelons.)

2. **MISSION.** This paragraph is a clear, concise statement of the denial task to be accomplished by the command and its purpose.

3. **EXECUTION.** In separate lettered subparagraphs, specify the mission or responsibility of each subordinate command. List each specific target or class of targets by category (significant

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(Classification)

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(Classification)

tactical targets and significant strategic targets), priority of execution, date or period within which execution must be accomplished, and other appropriate instructions. In the final subparagraph, titled "Coordinating instructions," give details of coordination and control measures applicable to two or more elements of the command or to the command as a whole. This subparagraph may include limitations on means of denial to be used, degree of destruction required or permitted, use of contaminants, and evacuation or disposition of indigenous population, including governmental officials and scientific personnel. In the last subparagraph also refer to appropriate appendixes, such as atomic demolitions appendix, contaminants appendix, demolitions appendix, and evacuation appendix.

4. ADMINISTRATION AND LOGISTICS. This paragraph contains instructions concerning administrative matters and logistical arrangements for the execution of the denial plan, such as allocation of indigenous labor, use of local resources, transportation, and storage of emergency demolition materiel. Reference may be made to an administrative appendix, annex, or plan (order).

5. COMMAND AND SIGNAL. This paragraph contains instructions concerning signal and command including, when appropriate, reference to an SOP, SOI, or annex to an existing plan (order). An alert signal to commence the time phasing of the execution of demolitions is also included. (May be in SOP or SOI). This paragraph also contains instructions for reports of intended location, extent, and type of demolitions, minefields, contaminants, and evacuations as well as acknowledgment instructions.

.....
Commander

Appendixes (include complete details of execution of targets concerned)

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Example: Denial Plan Annex to Letter of Instruction

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Annex F (Denial Plan) to Letter of Instructions Number Seven
Map: FARBEN, 1:1,000,000 Strategic

1. SITUATION

a. Enemy forces: Annex B (Intel) to Letter of Instructions
Number Seven.

b. Friendly forces.

(1) Letter of Instructions Number Seven.

(2) US Naval Forces, OLYMPIC, conducts sea and air attacks against NORTH FARBEN and Aggressor-held ports, supports US Army Forces, FARBEN; interdicts BLUE Sea coastal highway through MAJESTIC Mountains.

(3) US Air Forces, FARBEN, conducts air attacks against enemy transportation net and logistical installations; supports US Army Forces, FARBEN, with tactical, reconnaissance, and cargo aircraft.

c. Assumptions.

(1) Aggressor forces will reinforce and support North Farbenian attack if hostilities are resumed.

(2) Tactical nuclear weapons will be employed by both forces.

(3) Farbenian ground forces will not be available to reinforce the defense until 1 March 19....

(4) Enemy forces may penetrate WHITE River line three days after launching attack.

2. MISSION. US Army forces FARBEN executes denial operations in MAJESTIC Mountains and on WHITE River to prevent enemy passage of MAJESTIC Mountains and impede his advance across WHITE River, deny him strategic industrial facilities, and deny or impair his employment of transportation and logistical facilities in zone for minimum of 180 days.

3. EXECUTION.

a. 14 Army Group.

(1) Priority 1.

(a) Significant Tactical Targets

(Classification)

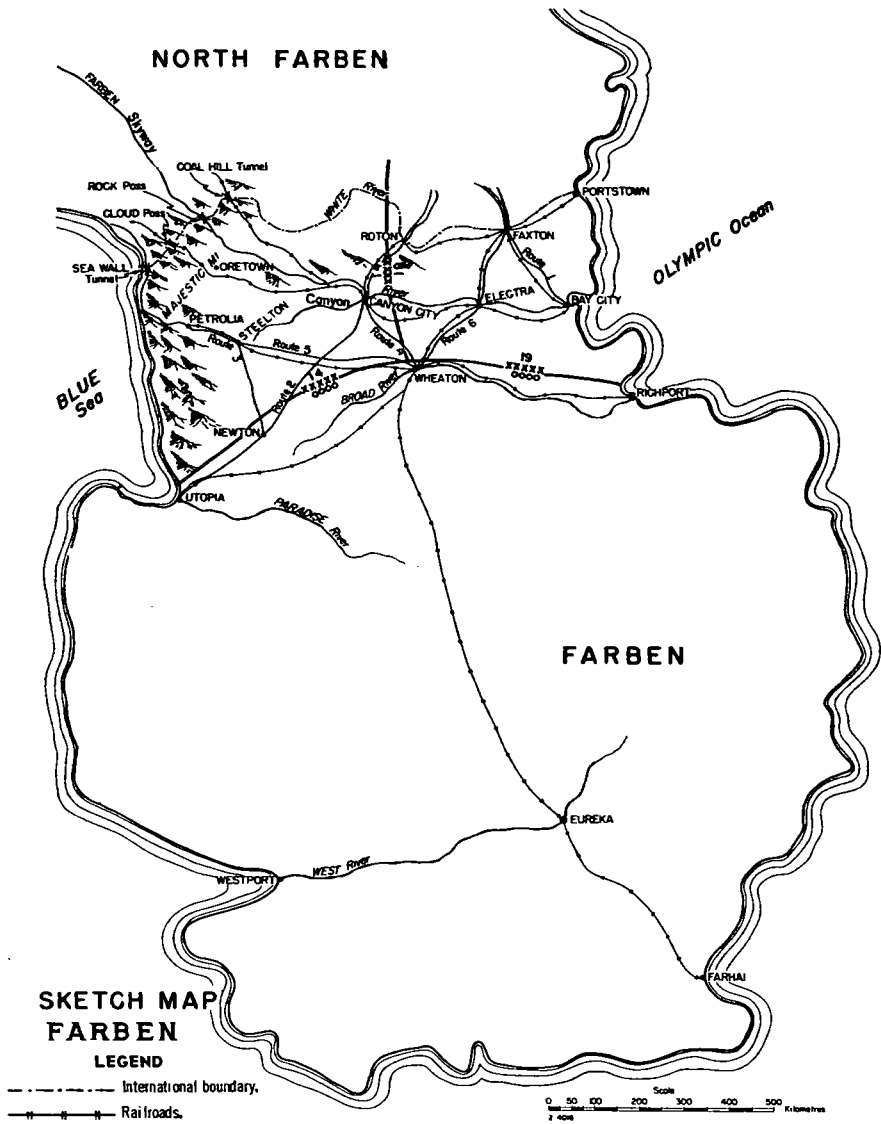


Figure 14. Sketch map, FARBEN.

(Classification)

Target	Remarks
<u>1.</u> SEA WALL Tunnel.	Prepare for atomic demolition; demolish on resumption hostilities or on denial alert signal.
<u>2.</u> CLOUD Pass.	
<u>3.</u> ROCKY Pass.	
<u>4.</u> COAL HILL Tunnel.	
<u>5.</u> All railroad and highway bridges over WHITE River in zone.	Demolish on resumption hostilities or on denial alert signal.
<u>6.</u> WHITE River dams in zone.	

(b) Significant Strategic Targets

Target	Remarks
<u>1.</u> Uranium and pitchblende mines in zone.	Prepare for atomic demolition; demolish if threatened with capture.
<u>2.</u> Nuclear energy plant, CANYON City.	Prepare for demolition; demolish if threatened with capture.
<u>3.</u> Oil refineries, PETROLIA.	

(2) Priority 2.

(a) Significant Tactical Targets.

* * * * *

b. 19th Army Group.

(1) Priority 1.

(a) Significant Tactical Targets.

* * * * *

c. Coordinating instructions.

- (1) Priority one—Evacuate all nuclear scientific personnel in zone to WHEATON to prevent capture.
- (2) Priority two—Evacuate principal Farbenian governmental officials of national, provincial, and municipal agencies in zone to WHEATON to prevent capture.
- (3) Evacuate inhabitants of demolition areas prior to detonation of atomic demolitions.

- (4) Employment chemical contaminants not authorized; prepare plans for possible employment; napalm authorized.
- (5) Maximum evacuation preferred to destruction.
- (6) Maximum destruction of ports, bridges, railroads, tunnels, airbases, POL facilities and stocks, and those industrial facilities valuable to enemy war potential.
- (7) All atomic demolitions, bridges over WHITE River, nuclear energy plant CANYON CITY, oil refineries PETROLIA, ore smelters ORETOWN, steel mills STEELTON are "reserved" demolitions; control of execution will not be delegated below army level.
- (8) Maximum delegation of execution of significant tactical targets to corps or lower echelons. Retain minimum essential execution authority at army group or army level.
- (9) Maximum execution of significant strategic targets by army group or army. Require minimum essential execution of corps or lower echelons.
- (10) Clear indigenous personnel from the area within 20 miles of MAJESTIC mountain passes and tunnels; clear 10 mile zone along south bank WHITE River of civilians, except essential war industrial personnel.
- (11) Maximum utilization of indigenous personnel in evacuation program; minimum employment in destruction.
- (12) Submit requirements for specialized demolition teams to assist in execution of significant strategic targets.
- (13) Complete denial plans will not be distributed below army level.
- (14) Appendix 1, Atomic Demolitions Plan.
- (15) Appendix 2, Demolitions Plan.
- (16) Appendix 3, Chemical Contaminants Plan.
- (17) Appendix 4, Evacuation of Materiel Plan.
- (18) Appendix 5, Evacuation of Personnel Plan.

4. ADMINISTRATIONS AND LOGISTICS.

a. ADMINO 7.

b. Maximum use of indigenous resources to support displaced indigenous persons.

c. Maximum use of indigenous transportation facilities to evacuate specified indigenous personnel, supplies, and equipment.

d. Maximum use of indigenous demolitions equipment, materiel, and facilities.

5. COMMAND AND SIGNAL

a. Signal Index 3, SOI.

b. Denial alert signal. Index 3, SOI.

c. Reports and Records.

(1) Atomic demolitions. Appendix 1, Atomic Demolitions Plan.

(2) Demolitions. Appendix 2, Demolitions Plan.

(3) Minefields. Report intended location and extent of barrier minefields; estimated time of completion; and location of lanes and gaps.

(4) Toxic Chemical Agents and Mines. Appendix 3, Chemical Contaminants Plan.

(5) Evacuations.

(a) Appendix 4, Evacuation of Materiel Plan.

(b) Appendix 5, Evacuation of Personnel Plan.

Acknowledge.

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Appendixes 1—Atomic Demolitions Plan (omitted)

2—Demolitions Plan

3—Chemical Contaminants Plan

4—Evacuation of Materiel Plan

5—Evacuation of Personnel Plan (omitted)

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Appendix 2 (Demolitions Plan) to Annex F (Denial Plan) to Letter of Instructions Number Seven.

Map: FARBEN, 1:1,000,000 Strategic.

1. SITUATION

a. Enemy forces. Annex B (Intel) to Letter of Instructions Number Seven.

b. Friendly forces. Letter of Instructions Number Seven.

2. MISSION. Plan, prepare, and execute demolitions as directed to deny strategic facilities to enemy, to impede his advance, and to impair his employment of transportation and logistical facilities in zone.

3. EXECUTION.

a. Priority items for destruction and preferred method of destruction for each type item are listed below:

(1) Oil refineries, PETROLIA.

(a) Cracking towers—explosives.

(b) Steam plants—explosives.

(c) Pumps—explosives.

(d) Cooling towers—fire.

(e) POL stocks—fire.

(2) Ore smelters, ORETOWN.

* * * * *

b. Coordinating instructions.

(1) Maximum employment of indigenous demolition equipment, materiel, and facilities.

(2) Minimum employment of indigenous personnel in demolitions.

(3) Demolition sufficient to deny targets for a minimum of 180 days.

(4) Employ boobytraps to the maximum extent practicable after evacuation to hinder or prevent repairs and rehabilitation by enemy forces.

(5) Refer to current field and technical manuals for details on methods of destruction.

4. ADMINISTRATION AND LOGISTICS. ADMINO 7.

5. COMMAND AND SIGNAL.

a. Signal Index 3, SOI

b. Denial Alert Signal. Index 3, SOI

c. Reports. Render reports on standard form to this headquarters. Include location, type, extent, estimated time of em-

placement, unit responsible for execution, and estimated delay or denial to be accomplished.

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Appendix 3 (Chemical Contaminants Plan) to Annex F (Denial Plan) to Letter of Instructions Number Seven.

Map: FARBEN, 1:1,000,000 Strategic.

1. SITUATION

a. Enemy forces. Annex B (Intel) to Letter of Instructions Number Seven.

b. Friendly forces. Letter of Instructions Number Seven.

2. MISSION. Plan for and employ on order toxic chemical contaminants to contaminate significance tactical and strategic denial targets.

3. EXECUTION.

a. Use of flame munitions authorized.

b. Employment of toxic chemical contaminants only on order of this headquarters.

c. When employment of toxic chemical contaminants is authorized, the following applies:

(1) Employ toxic chemical mines to hinder repair and rehabilitation of facilities when determined by army that the facility is of sufficient importance that enemy probably will attempt immediate rehabilitation.

(2) Employ toxic chemical mines in AT and APers minefields to hinder penetration and clearing.

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- (3) Use toxic chemical agents to contaminate enclosed facilities such as shaft mines, power plants and cable vaults after demolitions have been carried out.
- (4) Minimum employment of indigenous personnel.
- (5) Evacuate inhabitants in the vicinity of facilities to be contaminated prior to release of toxic chemical agents.

4. ADMINISTRATION AND LOGISTICS. ADMINO 7.

5. COMMAND AND SIGNAL

a. Signal Index 3, SOI

b. Denial Alert Signal. Index 3, SOI

c. Reports.

- (1) Toxic Chemical Mines. Report recommended location, type of agent, estimated time required to emplace, primary and secondary units responsible for execution, and estimated delay or denial to be accomplished. Prepare standard minefield reports in detail at the time mines are laid.
- (2) Facility Contamination. Report location, agent used, extent of contamination, unit responsible for execution, and estimated delay or denial to be accomplished.

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Appendix 4 (Evacuation of Materiel Plan) to Annex F (Denial Plan) to Letter of Instructions Number Seven.

Maps: FARBEN, 1:1,000,000 Strategic.

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(Classification)

1. SITUATION

a. Enemy forces, Annex B (Intel) to Letter of Instructions Number Seven.

b. Friendly Forces. Letter of Instructions Number Seven.

2. MISSION. Evacuate materiel as directed to deny strategic facilities to enemy, to impede his advance, and to impair his employment of transportation and logistical facilities in zone.

3. EXECUTION.

a. 14th and 19th Army Groups.

(1) Highway. Prepare plans for use of highway net in zone to provide supply to forward units and evacuation of materiel (Annex F).

(2) Rail.

(a) Notify COMMZ when to evacuate locomotives and rolling stock (Annex F).

(b) Upon COMMZ request, assist in destruction of rail equipment and facilities.

(3) Water.

(a) Notify COMMZ when to evacuate river and barge craft (Annex F).

(b) Upon notice to evacuate, craft which are loading, unloading, empty, and/or enroute west of ELECTRA, will be evacuated without completing loading or unloading.

(c) Upon denial alert signal, all inland waterway traffic moving inland prohibited west of ELECTRA.

(d) Upon COMMZ request, assist in destruction of craft and inland waterway facilities.

(e) No evacuation by BLUE Sea. Maximum use of intra-coastal waterway.

(4) Air.

(a) Forty (40) tons Air Force air lift allocated each Army Group to support evacuation plan.

(b) Continue normal air evacuation.

(5) Indigenous Transportation.

(a) Establish control of indigenous commercial and private highway conveyances in zone.

(b) Maximum use of indigenous transportation for evacuation of indigenous personnel, supplies, and equipment in the MAJESTIC Mountain area and designated atomic demolition areas (Annex F).

b. Communications Zone.

- (1) Continue transportation support of combat forces.
- (2) Operate all railways and waterways in the combat zone.
- (3) Receive and maintain evacuated materiel.
- (4) Maximum use by combat forces of returning COMMZ highway, rail, inland waterway, and intra-coastal transport capability for evacuation of materiel from combat zone.
- (5) Immediately unload and return all field army highway or air transportation evacuating materiel to the COMMZ. Return loading of organic army transport will be authorized provided:
 - (a) Loading does not delay turn-around time more than 3 hours.
 - (b) Destination of return load is the combat area to which the transport is returning.
- (6) If required, request assistance from Army Groups for destruction of rail equipment and facilities, floating craft, and inland waterway facilities.

c. Coordinating Instruction.

- (1) This plan is effective for planning upon receipt effective for execution upon denial alert signal.
- (2) Army Groups coordinate evacuation of rail equipment, river and barge craft with COMMZ to insure maximum evacuation.
- (3) Army Groups determine priorities for movement by COMMZ highway transport within the army areas.
- (4) Army Groups coordinate demolition of bridges, tunnels, and transportation facilities with COMMZ and demolition of air fields with Air Force.
- (6) Direct communication between armies and COMMZ authorized to insure maximum use of available transportation.

4. ADMINISTRATION AND LOGISTICS

a. ADMINO 7.

b. Maximum use of indigenous labor for the loading of supplies and equipment to be evacuated and for evacuation of rail and inland waterways transport equipment.

5. COMMAND AND SIGNAL

- a. Signal Index 3, SOI.
- b. Denial Alert Signal. Index 3, SOI.
- c. Reports. Report type and quantity of material to be evacuated and estimated delay or denial to be accomplished. Report status of evacuation by 1800 hours daily.

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